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Citrus Insect Control
For November, 1955

Florida Citrus Mutual
Research: Prosperity for Florida
Citrus Growers

The West Indian Or
Barbados Cherry

ING Of The Pests

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Citrus Insect Control



R. B. Johnson

For November
1955

W. L. THOMPSON,
R. M. PRATT
R. B. JOHNSON*
Florida Citrus Experiment
Station, Lake Alfred



W. L. Thompson

Red scale infestations will be a major problem in many groves in November. Activity increased sharply through October and was at the highest level in five years of record at the end of the third week. Hatching was at a peak at that time, and the resulting scale population can be expected to remain high through most of November.

Purple scale activity was also at a high level at the end of October and infestations will be high through November. A hatching peak will occur about the first of the month and young scales will be numerous at that time.

Rust mite infestations on leaves were at a moderate level in October, but fruit infestations were extremely high. Approximately one out of four of all the fruits examined in 130 groves was infested. Although a declining trend through November is expected, the level of activity will still be high.

Purple mite infestations were generally low in October, but are expected to increase in November. If the weather is normally dry, groves which are lightly infested now may be expected to be heavily infested by the end of the month.

SPRAY PROGRAM

During November all threatening scale infestations should be cleaned up. Red scale is a problem in many groves. Too many living scales are being found on tree tops, even in groves sprayed within the past six weeks. Where control on tree tops was unsatisfactory, it may be advisable to respray the tops. This may be done by building a guard rail around the top of the tank of a high pressure sprayer and having the men spray from the top of the tank. For very high trees, it may be necessary to build a platform high enough so the

tops can be thoroughly sprayed. The sprayer should be moved slowly enough so that each man can thoroughly spray one-half of each tree top. Parathion is the preferred scalicide because if parts of some trees are resprayed there is not so much danger of leaf drop or injury from cold weather as there is with oil. Apply the spray during calm weather so the men will not get wet.

Purple scale is also increasing in some groves. An unusually heavy fruit drop at this time of the year is an indication of purple scale around the stem. However, fruit may drop from other causes but if the stem-end of dropped fruit is examined and found to be infested, the scales were probably a factor in causing it to drop. A combination of dry weather and a purple scale infestation can cause a severe drop of fruit. In November, a scalicide application has reduced the scale population enough to check the fruit drop.

Chaff scale, as well as purple scale, should be controlled on tangerines so that when the fruit is harvested there will not be green spots on the fruit after it has been degreened.

Purple mite infestations usually build up in November. When checking for purple mites at this time of the year, or at any time during the winter, examine the green twigs as well as leaves. Where only a few mites are found on the lower portions of the trees, the tops of some trees should also be examined because mites are most numerous on tree tops during cool weather. If only a few mites are found, it is time to spray. As stated in the October article, the longest periods of control have been where the miticide was applied before mites were numerous.

Another point in control to consider is rainfall following within a week or ten days after a miticide application. With most of the organic miticides now in use, the residual effect of the miticide is depended upon to kill the young mites as they hatch. If the application is made on trees

with a light infestation with few eggs, the active mites are killed and if rain occurs a couple of days later, the only source of reinfestation is from the few unhatched eggs. If a miticide is applied on a heavily infested tree where eggs are also numerous and rain washes off the miticide, the initial control is not so important because as soon as the eggs hatch the trees are again heavily infested. In case a rain does follow a miticide application on heavily infested trees, it would be well to inspect the trees within a couple of weeks and if young mites are present, it would be advisable to respray or dust the grove before the mites mature and start depositing eggs.

If the weather continues to be dry and trees become heavily infested, a severe leaf drop may be expected. A couple of days of windy weather during dry weather may cause leaf drop but if purple mites are numerous at that time the leaf drop will be more severe. Thus timing of the spray becomes as important as the materials used if injury is to be prevented.





Rust mite control is as important in winter as during any other time of the year, even though the crop may have been picked. A heavy infestation of rust mite on leaves and twigs can cause as severe defoliation as purple mites. Check leaves and fruit for mites. A more thorough sulfur application is needed in cool weather than during hot weather for rust mite control.

Scale Control: Parathion at 1.0 to 1.7 pounds per 100 gallons is the preferred scalicide during the fall and winter months. Oil emulsion is as effective as parathion in killing scale but it is not recommended because, if a freeze should occur, those trees sprayed in November or later are more likely to be damaged. Fall and winter oil sprays may also prevent the trees from setting a normal crop of early fruit the following spring.



Purple Mite Control: Several miti-
(Continued on Page 15)

Written October 26, 1955. Reports of surveys by Harold Holtsberg, Cocoa; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. M. Sutton, Lake Alfred.

Parathion sprays in fall and winter months

AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30				

have no injurious effect on trees or fruit...

FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
		4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

will not affect amount of fruit set next year

Parathion sprays do not reduce the soluble solids content or Vitamin C content of citrus, do not harm fruit color or retard degreening. This holds true even in winter months, when other methods of pest control may have a definite adverse effect on soluble solids content, Vitamin C content and degreening.

For winter spraying, insist on **THIOPHOS Parathion**

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KING OF THE PESTS

BY NORRIS LEAP

Since the beginning, we humans have bragged that we were the brainiest things alive. Now it turns out that we were being outsmarted by a worm that hasn't a brain in its head. Really this worm is about as big as a grain of salt, but like dogs, boys and lies, it comes in a thousand shapes and sizes.

The worm is the nematode, and only lately have we taken a close look at it. The look has been eye-opening. It shows that all through the centuries this brainless worm has exacted from us brainy humans a heavy tribute that would make a king's ransom look like play money.

The worm now is suspected of annihilating two civilizations—the Mayan in Mexico and the Khmer in Indochina—and of helping to send whole areas of Southern-belt farm-lands back to brush and hardwood. It is accused of costing the American farmer and gardener today, in 1955, a tenth of all they grow. And if that isn't hay, at today's prices it would be enough to cram two solid lines of hay barns from coast to coast.

The nematode has laid waste groves of citrus trees. It is weakening orchards of deciduous fruits. It is sapping the vigor of cotton on millions of acres. It has banished sugar beets from ideal sugar-beet land. It has thrown a Grade A scare into potato men. It has cost a single citrus grower in California more than \$1,000. It has despoiled tobacco seed-lands and fields of growing tobacco. It

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has cost almost entire crops of bulbs of commercial growers in Oregon. In California it is besieging 1,000,000 acres of vineyards. It has ravaged truck gardens from Florida to Michigan and from New York to California.

Every state in the union has been hit, and every agricultural county in some southern states and California. California soil scientists moan the loudest. They say the nematode is costing California's farmers alone crops worth \$200,000,000 to \$300,000,000 a year—about one dollar's worth in every six or seven produced.

All of this has led to a war against the worm, a war which began in a quiet way many years ago. Today the war is churning up into a first-grade fracas, with its reverberations starting to echo throughout the world of agriculture. It's a war which has brought its moments of triumphs to us humans, but more often has been just baffling, exasperating and expensive. We've hauled out our proudest weapons—our sciences, our machines and our vaunted brains—and trained them all on our witless enemy. And the results? Well, it's true that we've won some preliminary campaigns along a wide front of farm

and garden products, victories so important that they conceivably could affect this nation's agricultural economy. Our big weapon is soil fumigation. But the worm hasn't lost. It has been contained here and pushed back there, but, on the whole, it is stronger than ever. And it has given a definite promise: The war will go on forever, for if ever it is lost, it won't be by the worm. It hasn't sense enough to give up.

Few people have seen a nematode, but almost everyone has seen its handiwork. Didn't you ever see a carrot with "whiskers"—one with a messy growth of rootlets? Or a be-whiskered beet or turnip or parsnip, ugly with knobs and ridges? Didn't you ever try to grow a prized rose-bush or gladiolus or iris or African violet? And no matter how many sprays you used or how much fertilizer and loving care you gave it, the darned thing just wouldn't flourish? Yes? Well, your trouble could be nematodes.

Long ignored as one of the relatively harmless plant parasites, the nematode has been unmasked for what it is, the king of pests the world over—the only one which attacks virtually all domestic plants in all climates. And it is the only one which has so high a batting average in getting its crimes blamed on other pests. It is the confidence man of the soil. For generations its depredations here and in Europe were blamed on other pests and on such vague agricultural ail-

ments as "soil sickness" and "soil exhaustion."

One of the smoothest deceptions ever perpetrated by a nematode was in Florida, where "spreading decline" has become a byword for disaster in a citrus grove. It took twenty-five years of scientific detective work to expose the villain in the piece. "Spreading decline" was noticed in a few trees before 1928. Then a "sick" spot became an expanding circle. The rate of the circle's growth was nearly as steady and as inexorable as the march of time. The rate was one and a half rows of citrus trees each year. Spreading decline ignored barriers. It crossed culverts and railroads and 100-foot-wide highway rights of way, and always at the same slow-motion pace.

Finally, in December, 1953, when 3000 acres of citrus trees were dead or doomed, the culprit was named. It was the burrowing nematode, a hitherto little-known variety, probably introduced by banana plants or other tropical ornamentals. Identifying that nematode was the climax of painstaking, sometimes heartbreaking scientific detection that lasted through two generations of researchers. It revealed anew the confidence-man tricks of the nematode family. The burrowing nematode had so operated that suspicion for years was aimed at fungi, bacteria and other microscopic organisms which cause rotting of roots. The microscopic life had caused the rotting, right enough, but the nematodes had opened the door for them, making the first entry into the roots and stopping the flow of nutrients.

The spreading-decline problem has cost millions of dollars and will cost millions more, but it is only a minor phase of the war against nematodes. The war might have started a century or more earlier if it had not been for a scientific jurisdiction squabble a long time ago over the word "insect."

When entomology branched off from zoology it took the realm of insects. The word "insect" comes from the Latin "insecare," which means "to cut in." Insects appear almost cut in two between head and thorax. Since a nematode at no stage is an insect, the entomologists ignored it. When plant pathology developed, it dealt with the microscopic world of fungi, bacteria and such. A nematode is thousands of times larger than a bacterium. Under a microscope it looks as big as an elephant. Obviously, said the plant pathologists, it was not for them.

And so, for more than a century after nematodes were discovered in 1743 they went unhampered by any snoop-

ing scientists. Finally a snooper or two got in a lick or two, but it was not until after the turn of this century that anyone took nematodes particularly seriously. Even today there are only two dozen nematologists in this country, compared with thousands of entomologists and plant pathologists. Those two dozen have come up with a sizable mass of information about nematodes and the havoc they wreak and what to do about them. They have been shouting about it at the top of their lungs. But until lately the sum total of their clamor has amounted to very faint voices crying in a wilderness of agricultural din. Furthermore, the nematologists say that what they have learned is only a drop in the bucket of knowledge that is needed.

Explaining the sweet mystery of life never had anything on trying to explain nematodes. They have more ways of doing business than a Chinese trader. Many are like the burrowing nematode—it isn't that they do so much damage themselves as that they open plant rootlets to death-dealing microscopic organisms. Some are like the golden nematode of potatoes; they work boldly, and simply defy you to stop them. Some are specialists, like the citrus nematode, which go for the roots of almost nothing but citrus and olive trees. And some are like the root-knot nematode, the worst of the lot. It is at home in the roots of 1700 different plants, including many of the farmer's favorites. It works not only as a confidence man but also as an out-and-out highjacker. Sometimes it works in both roles in the same plant, as in cotton. It attacks the plant's boldly as a nematode, but it also is the parasitic Fagin that leads on the fungus which causes fusarium wilt. The double-barreled attack can leave a field with too few cotton bolls to make a house dress.

Probably the safest thing you can say about nematodes is that there are only two universal truths about them: One is that almost any sweeping statement about them is fairly certain to be true; the other is that it is just about as sure to be false.

For instance, nematodes are called plant parasites. But there are thousands of varieties. Hookworms are nematodes. So are the organisms which cause trichinosis and filariasis. Also, it's fair to say nematodes are about as big as a grain of salt, with some a little larger. But they grow four feet long in Africa.

Then there is the nematode's seeming delicacy. They appear so fragile that a good hard look would kill them, and at some stages it just about would. They slow down when it gets

cold and come to a complete stop at ten degrees above zero Fahrenheit. They die when it gets too hot. When nematodes become too numerous in California's Imperial Valley, the farmer simply turns over the earth two or three times in the summer heat and kills them by the billions. Their life span is considered to be not much more than a few weeks to a few months.

But those selfsame nematodes can be the most durable of God's creatures. The golden nematode of potatoes can live in the cyst for twenty years. The rye nematode has been revived after a beauty sleep of thirty-nine years!

Again, nematodes appear to be about as stupid and helpless creatures as you could find. They have no brains, as such. They have no eyes. They have no means of getting from place to place except to wriggle—a lifetime of wriggling would get few more than six or eight inches from a tail.

Then you look at a sugar-beet nematode—as a fair example of the tribe—and you wonder. For a creature without brains, she—most are females—seems about as stupid as a fox. The sugar-beet nematode starts life in a cyst that is her citadel. She doesn't leave until she gets the signal she wants. When she does venture out, she goes armed with sword and buckler and her own chemical factory. Her buckler is her skin. That's where she wears her skeleton. It is an amazingly tough material. Her sword is as fine as any steel and sharper than any blade known to man. Stilet-shaped, it is called a stylet. Its sheath is the nematode's mouth. The stylet is an instrument so sharp and tough that it will pierce the skin of a rootlet. And in the nematode's scale of things, a rootlet's skin is as wall of rawhide as hard as an oak and nearly as thick. No other living thing of the nematode's world can pierce it.

Once the sugar-beet rootlet's skin is pierced, the nematode is in business. Like many other nematodes, she squirms all the way inside. But unlike many others, she does not like plant nutrients as they flow in the rootlet. And so she calls on her chemical factory and gives the rootlet a shot of her home-brewed chemicals. The rootlet obligingly creates what are called giant nectarial cells, her favorite food, and the nematode feasts.

She feasts so heartily that she enlarges her home, and her rear pops out. Then a peculiar thing happens. Her rear continues to swell. It exudes a jellylike mass. She lays eggs in that mass. Just what she has in that

mindless mind of hers, no one knows. But she isn't satisfied with laying eggs only in the jelly. She lays eggs inside her own body too. All together, she may lay only 100 or 200, but if she's really in earnest, she will lay upward of 1000. She lays eggs with such determination that soon most of her body is just one big mass of eggs.

By then her body is lemon-shaped and half the size of the head of a pin. Her head is still inside the rootlet. You can see her body with the naked eye, and with a flick of the fingernail you can decapitate her. But if a fingernail comes along, two things take place: The skin turns brown and tough, and mamma nematode dies or perhaps it's the other way around—she dies and the skin turns brown and tough. No one seems to care; east of all the baby nematodes that her body houses in their egg sacs. At that stage, mamma nematode's body is called a cyst. It is the young nematodes citadel. And about the only way you can kill the little nematodes in it is to place the cyst in an anvil and strike firmly with a hammer.

The nematodes outside the cyst—those in the jelly mass—apparently are the lightheaded, irresponsible type. They hutch as promptly as possible and go off into a world which at the time may hold only starvation and death for a growing sugar-beet nematode.

Not so those inside the cyst. They are the let's-not-be-hasty type. They may not have minds, but they certainly know what they want. And what they want is the signal which says now is the time for all good little sugar-beet nematodes to come out and feast. No one but a sugar-beet nematode knows quite what the signal is, but it's as definite as chow call aboard ship. The signal is the presence of food. Leach some water from a sugar-beet rootlet to the vicinity of her cyst, and out she pops, racing to be the first in the chow line. After that it's a happy story for her. She stabs her way into the rootlet, injects her chemical and starts contentedly to produce a new crop of nematodes.

What happens to the plant is, curiously, a frantic kind of combat. Plants, too, have a sort of intelligence. When a plant finds that a rootlet is being tapped, it sends out another. That is good news to young nematodes. They leap to the call of food and attack the new rootlet. The plant counters with still another rootlet. The nematodes send out new battalions of young. Soon the plant has a mass of rootlets which looks like a hermit's whiskers—just as many and just as untidy. Such plants have

lackluster leaves. Many are stunted. Many more die. The grower may get as little as a 10 per cent crop.

Ever since man first scratched the earth and planted a seed he has been battling and befriending nematodes. Until lately he has been much more of a friend than an enemy. Even today man as a friend could hardly be sneered at by a nematode.

Whenever a nematode seeks new fields to conquer, she puts her trust in man. And man rewards her trust so fully that from a nematode's viewpoint it must be quite touching. He carries her wherever she wants to go, be it a few feet or a few thousand miles. He carries her to a new county or a new country in the small bits of dirt which are found in seed. He carries her in the pots of soil in which seedlings travel across countries and continents and oceans. And once she gets into a piece of soil, man carries her about the land in a dozen different ways. The plow that tills the soil spreads the nematodes along the furrows. The farmer's boots do a fair job of spreading them. Even irrigation canals are suspect as carriers.

The progress of nematodes in row crops can be watched. The plants at the focal point of infestation are stunted or dead. Year by year the area of destruction grows. It spreads up and down the furrows and from row to row. Sometimes it takes ten or a dozen years to capture a field. Occasionally there is the appearance of capture in a year or two. But any time nematode infestation appears, it's a safe bet that nematodes have been there for several years—often a dozen or more.

In tree crops and vineyards, nematodes apparently don't show their muscles for twenty or thirty years. Citrus production in California groves didn't start to decline noticeably for more than thirty years after the big plantings of the '90's. It was more than fifty years before it was proved that the state's 25 per cent drop in average per-acre production was chiefly the work of the citrus nematode.

But that is one of the things you can expect of nematodes. The nematode is a worm with patience. It can start with one worm in a field and in a decade or two have 3,000,000 or 4,000,000 to the cubic foot. And a decade or two is nothing to a nematode. It has centuries in which to work and, despite its lack of brains, seems to know its descendants will carry on. It never seems in a hurry to take over a field or an orchard. It is in a hurry only after it has taken over. Then sometimes the speed of destruction is appalling.

That is why such a storm worked

up over the invasion of Long Island by the golden nematode of potatoes. That nematode perhaps is feared the most of all. It can destroy 90 per cent of a potato crop. It has fouled so much of Europe's best potato land that most European nations limit the frequency of potato crops on infested land. One planting in four to eight years is the usual limit. Holland, Denmark and Sweden prohibit forever the planting of potatoes on land that has had the golden nematode.

The laws aren't framed that way. They only forbid planting potatoes on infested land. But no one yet has freed land of the golden nematode—nor, so far as I can learn, of any other nematode. Once you've got them, you've got them.

And so when the golden nematode, which works on potatoes much as the sugarbeet nematode works on sugar beets, was found on two potato farms near Hicksville, Long Island, the fat was in the fire. Or, worse, the golden nematode was in the United States. And that was something the nematologists always had dreaded.

They had good reasons. Potatoes are a big crop. They are grown commercially in all forty-eight states on a total of 1,400,000 acres. The farm value of the crop comes close to \$800,000,000. With handling, marketing equipment and chemicals, potatoes are about a \$3,000,000,000 industry.

The golden nematode was found in 115 acres of potatoes on two farms near Hicksville in 1941. Five years later it was in 1656 acres on forty-one Long Island farms. In 1954 it was 12,506 acres and 266 farms.

The worm made that kind of progress despite the most expensive and intensive antinematode campaign ever waged. The state of New York and the United States Department of Agriculture spent \$5,700,000 in a joint effort, starting in 1944. They are still spending at a \$500,000-a-year clip.

They've had laws passed rigidly governing Long Island's \$100,000,000 potato industry, requiring handlers and farmers to maintain almost hospital standards of sterilization of potatoes and equipment. They've surveyed twenty-two Eastern states for the golden nematode, making tens of thousands of tests of soils. They've made thousand soil inspections of soil products at entry ports and border stations—with a special eye on Mexican imports, for Mexico has the golden nematode. The fight against the golden nematode of potatoes is, thus far, a successful Chinese-wall type

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of operation—an attempt to hold the enemy off.

The big offensive war on other nematodes is just getting started. The two big weapons are the old stand-by, crop rotation and the new versions of an old technique, soil fumigation. But first a glance at some of the skirmishes. Some are a bit on the wierd side. Some are growing in significance.

Scientists are encouraging fungi which dine off nematodes. They are watching cannibal nematodes — of which there are many—to determine how they can encourage their cannibalism. They've found that mites devour bulb-and-stem nematodes of flowers. Those all are interesting operations, but none seems to have made much of a dent in the nematode populations.

A more sober look is being given the development of systemic poisons which work on plants somewhat as antibiotics work on humans; the plant is fed chemicals which kill nematodes in the roots without harming the plants.

Then there are the outsmarting tricks. Yes, sir, we've found that sometimes we can outsmart a nematode, and no comments, please. In Kern County, California, which brags about its production of potatoes, the grower simply beats the root-knot nematode to the potato. In normal years he harvests by June tenth. He has learned that by June fifteenth the second generation of nematodes—which does the big damage—is there.

Another trick is the trap crop, Root-knot nematodes, which dote on cotton, also have a fair fondness for alfalfa, a legume. *Crotalaria spectabilis*, a cover crop, is a legume. If you plant *Crotalaria spectabilis* where root-knot nematodes are, the nematodes go for its roots like kids for free ice cream. The catch is this: The nematodes pierce the *Crotalaria* rootlet, inject their chemical and feast. And that's all that happens. They don't grow. And they don't lay eggs. French marigolds have about the same effect in your garden. However, few people want solid gardens of French marigolds, and fewer farmers seem to want crops of *Crotalaria spectabilis*.

Everyone knows how crop rotation works. It works well, except for two things. One is that sometimes the nematode — especially the root-knot species — takes to the substitute as a cat takes to milk. The other is that rotation often is like substituting copper for gold. The substitute—in the case of sugar beets — may be

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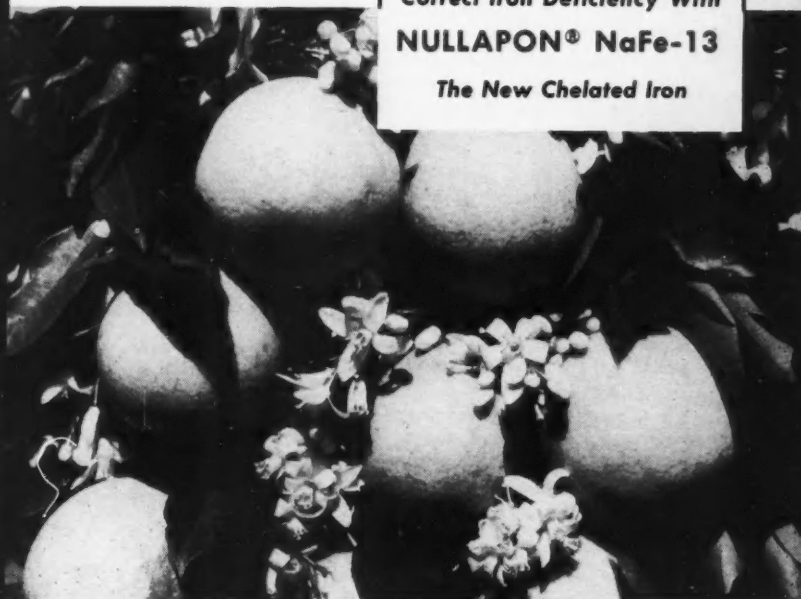
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a thirty-dollar crop instead of the \$300 crop it replaces.

Soil fumigants, while seventy-five years old in principle, are relatively new in the field. Sometimes they work like magic. They have been known to multiply cotton production by ten, sweet potatoes by seventeen, and other garden crops by nearly as much. They have restored to use marginal and abandoned land.

The new soil fumigants began to sell in 1945 after chemical concerns over the years had tested hundreds of substances. There are three leaders. They are dichloropropene-dichloropropane, called DD mixture, and made by Shell Chemical Corporation; and ethylene dibromide, known as EDB, and methyl bromide, both made by Dow Chemical Company. Methyl bromide is a gas, deadly to humans. It is applied to the soil under a plastic cover. It is used mainly for seed-beds and in greenhouses.

DD and EDB are heavy, volatile liquids. They are injected six or eight inches into the soil, days or weeks before planting. Both have had sensational successes in row crops in sandy loams. They are less effective in heavier soils. They have one fault. They not only kill nematodes and other pests in the soil; they also kill roots. They spell murder to an orchard or vineyard.

Shell this spring announced that it will market this year a chemical which will kill nematodes without killing roots of established plants. Stauffer Chemical Company announced one too. Success could be worth untold millions to owners of orchards and vineyards. The use of soil fumigants should mushroom into something big two or three years from now, judging by what happened in North Carolina. Field tobacco was fumigated for the first time there in 1948 on 150 acres. Last year growers paid about \$3,000,000 for their fumigants. They got back in increased production nearly \$25,000,000.

Chemical companies won't release figures, but the best guess is that 300,000 to 400,000 acres were fumigated last year at a cost of \$9,000,000 to \$12,000,000 for chemicals. Those figures are expected to go up about 25 per cent this year. After, that, who knows?

"The day is long gone," said one young nematologist, "when the farmer could move to new land when his old wore out, as the Mayans and Khmers did, and as they used to do in this country.

"The trouble is, hardly anyone will believe that nematodes are his trou-

(Continued on Page 14)

Influence Of Chemical Treatments And Polyethylene Bags On Keeping Quality Of Florida Grapefruit . . .

In the past the Florida citrus industry has had difficulty in marketing all its grapefruit. Consequently, certain sizes and crops of fruit have gone unpicked. The industry would benefit by an extension of the harvesting season provided decay was controlled and quality in fruit maintained. The consumer would also benefit by being assured a supply of good quality grapefruit during the summer.

SUMMARY AND DISCUSSION

The tests reported on here showed that grapefruit can be held successfully at 32° F. for about 4 weeks. Some control of decay resulted from prestorage chemical treatments with (a) Dovicide A (sodium orthophenylphenate)-hexamine (hexamethylene-tetramine) and (b) 2-aminopyridine-pyrrolidine, but control was not sufficient to increase storage life. The borax treatment weakened the fruit and made it susceptible to storage pitting and decay. Spoilage was caused mostly by penicillium rots, although some stem-end rot and watery breakdown occurred, especially in lots held 8 weeks at 32° plus 7 days at 70°.

The keeping quality of Florida grapefruit stored at 32° F. in polyethylene bags and lined boxes was determined. The carbon dioxide and oxygen atmospheres within the bags were partly controlled by breaking the seals on the bags at definite times. Some treatments showed promise for short storage periods, but 9 weeks at 32° proved too long, because high percentages of decay developed after removal from cold storage. Fruit stored in polyethylene bags was usually soft. If the seals were not broken on the polyethylene bags off-flavors developed in the fruit.

MATERIAL AND METHODS

In 1953, storage studies with Florida grapefruit were conducted at Orlando, Fla., and New York, N. Y. The tests at Orlando were with Marsh fruit grown on rough lemon rootstock in groves in central Florida. Those at New York were with Marsh fruit grown on sour orange rootstock in a grove near Fort Pierce, Fla.

The commercial packinghouse treatments consisted of washing, waxing, polishing, grading, sizing, and packing the fruit. For the storage tests at Orlando the fruit was packed in stan-

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dard wire-bound Bruce boxes, whereas for those in the New York tests it was packed in standard partitioned nailed boxes. These commercially treated lots of fruit without further treatments represented the "controls".

At Orlando, three chemical treatments were tested for control of decay in stored grapefruit, namely, Dovicide A-hexamine, 2-aminopyridine-pyrrolidine, and borax. Briefly, the Dovicide A-hexamine treatment consisted of immersing fruit for 2 minutes in a solution of 2 percent Dovicide A, 1 percent hexamine, and 0.05 percent Palmolive soap in the dip tank. The commercial handling and packaging of fruit occurred about 4 hours after the chemical treatment. The 2-aminopyridine-pyrrolidine treatment consisted of immersing fruit for 2

minutes in a solution of 2.5 percent 2-aminopyridine and 2.5 percent pyrrolidine in the dip tank. The fruit was packaged about 4 hours after treatment. The borax treatment consisted of immersing the fruit for 10 seconds in a 5-percent solution of borax in the dip tank. Commercial handling and packaging of fruit followed about 24 hours after the dip treatment.

The Marsh grapefruit used in the New York tests was picked April 28, 1953, packed and shipped April 29, and unloaded in New York City on May 4. Some boxes were packed with polyethylene bags (.002 inch thick) with paper liners (outside the polyethylene) to protect the polyethylene. Although plain paper liners would have been used, if available, to protect the polyethylene bags the liners were biphenyl-treated as they were the only ones available. Some lots were packed in boxes with biphenyl-treated liners only, as indicated in tables 5 to 7. The fruit, which graded U.S. No. 1 Bronze, was packed in standard nailed 1 3/5-bushel crates and shipped in a fan car containing 512 boxes. The car was initially iced and reiced once in transit. Initial fruit temperatures averaged 75° F. and arrival temperature 44°. Average transit temperature was 60°.

Storage temperature at Orlando was 32° F. and relative humidity 80 percent. At New York the storage temperature was 32° and relative humidity 90 percent, except for those boxes "purged" or stored at alternating temperatures. Purging consisted of transferring the fruit to 70°, relative humidity 75 percent, for a 2-day period at the intervals indicated in tables 5 to 7. Average pulp temperatures reached 59° after this period. The fruit stored at alternating temperatures was alternated at weekly intervals between 50°, relative humidity 85 percent, and 32° with the first week's storage at 50°.

The tests were designed to determine the effects of the following on quality of stored Marsh grapefruit.

1. Treatment with Dovicide A-hexamine and storage for 4 and 8 weeks at 32° F.

2. Treatment with 2-aminopyridine-pyrrolidine and storage for 4 and 8 weeks at 32° F.

3. Treatment with borax and storage for 4 and 8 weeks at 32° F.

4. Storage of fruit from different crops for 4 and 8 weeks at 32° F.

5. Exposing the fruit to higher temperatures (50° and 70° F.) at intervals during the storage period to

age, 5-box samples that had been given 3 of the treatments were inspected on arrival in New York and again after 3 days' and 7 days' holding at 70°. The treatments were (1) no liner, (2) biphenyl liner and (3) sealed polyethylene bags (inspected

70° F.

At the first and second inspections decayed grapefruit was discarded before the sound fruit was repacked in the test boxes. The amounts of decay for the second and third inspections are cumulative; that is, they include decay counts for all previous inspections. Pitting and aging records at the second and third inspections are not cumulative, but are based on actual counts made at the particular inspection.

RESULTS

Effect of Prestorage Chemical Treatment on Marsh Grapefruit

Stored April 21 and May 6 at Orlando Fla.

In general, keeping quality of grapefruit was good and percentages of decay small at the end of 4 and 8 weeks' storage at 32° (table 1). Decay did develop during the 7-day holding period at 70° and the development was particularly rapid between the third and the seventh day. Total decay was associated with length of storage, and smaller amounts occurred in the lots stored 4 weeks than in those stored 8 weeks.

The prestorage chemical treatments with Dowicide A-hexamine or 2-aminopyridine-pyrrolidine had slight effect on decay during either storage or the holding period at 70° F. Borax treatment was ineffective in the control of decay. Borax-treated lots generally had more decay than the "control" lots at the end of the 7-day holding period. Very little rind pitting developed during storage at 32° (table 2). Moderate and severe pitting was related to the length of the storage and was more serious in fruit stored 8 weeks than in that stored 4 weeks. Pitting was somewhat related to prestorage chemical treatments, and more pitting was generally found on the grapefruit treated with Dowicide A-hexamine and borax than on that

2/ Harding, Paul L., Friedman, B. A., Sunday, M., Bryan, Kaufman, J., and Hruschka, H. W. The Effect of Prestorage Treatments and Storage Temperatures on the Keeping Quality of Florida Grapefruit at Orlando, Fla., and at New York City, N. Y. H.T.&S. Office Report No. 285, pp. 28, 1952.

(Continued on Page 13)

Table 1. — Decay of Marsh grapefruit chemically treated before storage at 32° F. and subsequent holding for 0 to 7 days at 70°, Orlando, Fla. (Each value is an average from 5-box lots)

Date of storage and fruit treatment	Fruit decayed after 4 weeks storage + indicated period at 70°			Fruit decayed after 8 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
Percent Percent Percent Percent Percent Percent						
April 21, 1953:						
None (Control)	0	0	25	1	4	32
Dowicide A-hexamine	0	0	20	0	1	30
2-aminopyridine-pyrrolidine	0	2	23	0	2	39
Borax	0	1	45	0	6	61
May 6, 1953:						
None (Control)	1	2	40	0	11	76
Dowicide A-hexamine	0	1	40	1	8	62
2-aminopyridine-pyrrolidine	0	1	36	1	16	73
Borax	1	1	68	1	13	82

determine whether this practice would reduce the amount of pitting that occurs with continuous storage at 32°.

6. Build-up of carbon dioxide and reduction of oxygen by storing in polyethylene bags inside lined boxes.

after 7 days only).

The method of inspection of fruit was similar to that used in the earlier test. 2/ Fruit showing both aging and pitting was scored under the defect considered the more serious. Decay was always considered more

Table 2. — Moderate and severe pitting of Marsh grapefruit chemically treated before storage at 32° and subsequent holding for 0 to 7 days at 70°, Orlando Fla. (Each value is an average from 5-box lots)

Date of storage and fruit treatment	Fruit pitted after 4 weeks storage + indicated period at 70°			Fruit pitted after 8 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
Percent Percent Percent Percent Percent Percent						
April 21, 1953:						
None (Control)	0	2	1	4	17	15
Dowicide A-hexamine	1	1	2	4	8	9
2-aminopyridine-pyrrolidine	0	1	2	2	7	4
Borax	0	5	7	0	9	14
May 6, 1953:						
None (Control)	0	0	0	0	6	2
Dowicide A-hexamine	0	0	0	0	6	6
2-aminopyridine-pyrrolidine	0	1	1	0	2	0
Borax	0	0	1	0	3	1

Three methods of using polyethylene bags were tried as follows:

a. Sealing by tying the twisted film and breaking the seal when the fruit was removed from cold storage.

b. Sealing as in (a) but keeping the package sealed during the 7-day holding period at 70° F. when the fruit was removed from cold storage.

c. No sealing.

Each of the subsamples, including the "controls", consisted of 5-box lots. At the end of the storage periods indicated in tables 1 to 7, the fruit was removed from storage and inspected. It was then placed in a 70° F. room relative humidity 84 percent, to determine market life, and re-inspected after 3 days and again after 7 days.

To indicate the condition of the New York-stored fruit prior to stor-

serious than any type of skin breakdown. Decayed fruits were scored under stem-end rot when the symptoms were characteristic of diplodia rot or phomopsis rot, regardless of where the decay occurred. Three inspections were made, at the time the boxes of fruit were removed from storage and after 3 and 7 days at

Table 3. — Decay in Marsh grapefruit of various crops stored at 32° F. and subsequent holding for 0 to 7 days at 70°, Orlando, Fla., May 7-18, 1953. (Each value is an average from 5-box lots)

Crop	Fruit decayed after 4 weeks storage + indicated period at 70°			Fruit decayed after 8 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
Percent Percent Percent Percent Percent Percent						
A	0	1	35	1	16	82
B	0	1	15	1	10	77
C	0	0	12	1	9	89
D	1	2	15	1	21	68
E	0	0	13	2	12	68



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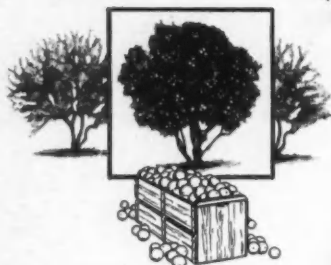
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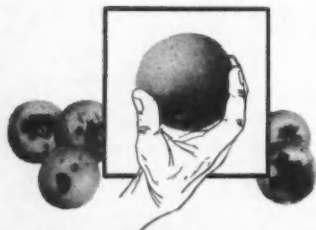
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INFLUENCE OF CHEMICAL TREATMENTS AND POLYETHYLENE BAGS ON KEEPING QUALITY OF FLORIDA GRAPEFRUIT

(Continued from Page 11)

treated with 2-aminopyridine-pyrrolidine.

Variation in Keeping Quality of Fruit from Different Groves

Fruit from different groves varied

6 percent, respectively, after 0, 3 and 7 days' holding at 70° F. Moderate and severe pitting at prestorage inspections was slight, averaging less than 1 percent after 7 days. Aging was negligible. All the fruit was in good condition; that stored in polyethylene bags was a little firmer than the rest. No off-flavor was noted.

Decay after storage — About 2/3

Table 4. — Moderate and severe pitting of Marsh grapefruit of various crops stored at 32° F. and subsequent holding for 0 to 7 days at 70°. Orlando, Fla., Mar. 7-18, 1953.

(Each value is an average from 5-box lots)

Crop	Fruit pitted after 4 weeks storage + indicated period at 70°			Fruit pitted after 8 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
	Percent	Percent	Percent	Percent	Percent	Percent
A	0	0	0	0	1	1
B	1	1	1	0	4	1
C	0	1	0	0	5	0
D	1	4	1	2	11	4
E	0	0	1	1	7	1

Table 5. — Decay in Marsh grapefruit stored at various temperatures and in boxes with different types of liners, New York, N. Y. May 4, 1953.

(Each value is an average from 5-box lots)

Temperature of storage and other treatments	Fruit decayed after 4 weeks storage + indicated period at 70°			Fruit decayed after 9 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
	Percent	Percent	Percent	Percent	Percent	Percent
32° without purging:						
Without liner	1	3	18	3	13	73
With biphenyl liner only	2	2	14	1	12	63
With biphenyl liner + sealed polyethylene bag with seal broken at removal from 32° (1/)	2	40	8	14	94	
With biphenyl liner + seal polyethylene bag with seal not broken at removal from 32°	-	3	-	-	68	
With biphenyl liner + non sealed polyethylene bag 1	2	19	2	8	96	
32° F., purged weekly at 70° without liner	4	6	18	16	28	50
32° F., purged biweekly at 70° without liner	2	3	21	13	26	53
50° F., - 32°, alternating, without liner	2	3	20	18	31	50
50° F., without liner	5	8	28	43	53	67

1/ Less than 0.5 percent

considerably in storage quality (table 3 and 4). There appears to be no accurate fast test for determining which fruit are strong or weak for storage. An attempt was made to study the effects of chemical treatments on fruit of good and poor quality, but the results were inconsistent and showed that complete reliance could not be placed on memory of the grower as to past performance. Another point of interest brought out by these studies was that certain lots of fruit with low records of decay after 4 weeks' storage were not the low lots after 8 weeks' storage.

Moderate and severe pitting appeared to be associated with specific crops.

Effect of Polyethylene Bags on Marsh Grapefruit

Stored May 4 at New York, N. Y.

Decay, pitting, and aging before storage — Decay was relatively low prior to storage, averaging 1, 3 and

of the decay in the New York tests was penicillium rot and most of the rest was stem-rot. Decay (table 5) after 4 weeks' storage was very low when the fruit was removed from storage and even after 3 days at 70° F. none of the lots had over 8 percent. After 7 days at 70°, decay ranged from 14 to 40 percent in all lots except in the lot stored in polyethylene bags in paper-lined boxes in which the seal was not broken when the crates were removed from storage. Here 3 percent of the fruit decayed. However, the fruit given this treatment was soft and decidedly off-flavor.

After 9 weeks' storage, all lots at temperatures above 32° F. for all or a part of the time had 13 percent or more decay. Those stored at 32° continuously had 8 percent or less decay when removed from storage. However, decay in this fruit increased rapidly after removal from storage. The non-sealed polyethylene lot was the only lot containing less than 12 percent decay after 3 days at 70°. This fruit was somewhat soft and decayed very fast upon further holding. Approximately 5 percent of the fruit in sealed polyethylene bags in paper-lined boxes had watery breakdown when it was removed from storage after a 9-week holding period. This increased to 15 percent in 3 days. Only an occasional fruit with watery breakdown was found in the lots stored without polyethylene bags.

Pitting and aging after storage — Pitting (table 6) was not important either upon removal after 4 weeks' storage or after a holding period at 70° F., except in the lot stored with biphenyl liners only. Here 11 percent of the fruit had moderate and severe pitting after 3 days. The

Table 6. — Moderate and severe pitting in Marsh grapefruit stored at various temperatures and in boxes with different types of liners, New York, N. Y. May 4, 1953.

(Each value is an average from 5-box lots)

Temperature of Storage and other Treatments	Fruit pitted after 4 weeks storage + indicated period at 70°			Fruit pitted after 9 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
	Percent	Percent	Percent	Percent	Percent	Percent
32° without purging:						
without liner	1	2	1	6	11	4
With biphenyl liner only	2	11	9	10	16	9
With biphenyl liner + sealed polyethylene bag with seal broken at removal from 32° (1/)	1	5	1	1	1	0
With biphenyl liner + sealed polyethylene bag with seal not broken at removal from 32°	-	(1/)	-	-	-	0
With biphenyl liner + non sealed polyethylene bag 1	3	3	2	4	1	
32° F., purged weekly at 70° without liner	1	3	2	1	1	0
32° F., purged biweekly at 70° without liner (1/)	1	(1/)	4	4	1	
50° F., - 32°, alternating, without liner	3	3	3	2	2	0
50° F., without liner	2	2	0	2	2	0

1/ Less than 0.5 percent.

results obtained in 1952 also showed slightly increased pitting when biphenyl liners were used.

After 9 weeks' storage, pitting was generally higher in all lots and an appreciable amount was found on re-

alternating temperatures of 50° to 32°

Flavor and gas analyses — Serious off-flavor was observed in the fruit stored in sealed polyethylene bags in paper-lined boxes when the seals were not broken until 7 days after removal

Table 7. — Severe aging in Marsh grapefruit stored at various temperatures and in boxes with different types of liners, New York, N. Y. May 4, 1953.
(Each value is an average from 5-box lots)

Temperature of Storage and other Treatments	Fruit aging after 4 weeks storage + indicated period at 70°			Fruit aging after 9 weeks storage + indicated period at 70°		
	0 day	3 days	7 days	0 day	3 days	7 days
	Percent	Percent	Percent	Percent	Percent	Percent
32° F. without purging:						
Without liner	1	2	1	2	2	2
With biphenyl liner only	1	2	1	2	3	1
With biphenyl liner + sealed polyethylene bag with seal broken at removal from 32°	0	0	0	0	0	0
With biphenyl liner + sealed polyethylene bag with seal not broken at removal from 32°	0	0	0	0	0	0
With biphenyl liner + non-sealed polyethylene bag	0	(1/)	1	(1/)	(1/)	(1/)
32° F., purged weekly at 70°	2	1	1	1	1	(1/)
32° F., purged biweekly at 70°	1	2	2	2	2	2
without liner	3	5	4	8	4	2
50° - 32°, alternating, without liner	6	8	6	4	4	1
50° F., without liner						

1/ Less than 0.5 percent

moval and after a holding period in the fruit stored at 32° F. without liners or with biphenyl liners only. Pitting was fairly well controlled by polyethylene bags and alternating temperatures or purging. The ap-

proportion of pitting was from either 4 or 9 weeks' storage. It can be noted in table 8 that carbon dioxide built up in these lots to a maximum of 31.8 percent and oxygen was down to less than 2 percent. None of the other polyethylene lots held

Table 8. — Atmosphere in polyethylene bags packed with Marsh grapefruit and stored at New York, N. Y., May 4, 1953.
(Each value is an average from 5-box lots)

Storage period and sealing	Carbon dioxide				Oxygen			
	When Removed from 32° F.		After 7 days at 70° F. 1/		When Removed from 32° F.		After 7 days at 70° F. 1/	
	Aver.	Maxi.	Aver.	Maxi.	Aver.	Maxi.	Aver.	Maxi.
	%	%	%	%	%	%	%	%
None (sealed liner)	—	—	10.2	12.0	—	—	6.9	3.7
4 weeks:								
Sealed bag	12.8	15.4	21.2	26.0	2.9	0.5	0.8	0.1
Nonsealed bag	4.1	5.0	—	—	15.1	14.0	—	—
9 weeks:								
Sealed bag	12.1	15.4	29.4	31.8	2.8	1.0	2.0	0
Nonsealed bag	3.9	8.4	—	—	16.0	12.0	—	—

1/ Seal not broken when removed from storage.

parent decrease in pitting after longer holding, particularly after 7 days at 70° following 9 weeks' storage, is due to decay entering pits so that the individual fruits were scored as decayed at this final inspection.

Aging (table 7) was not serious in any of the lots except those stored at 50° F. continuously or at the

for 4 weeks had off-flavor after a 7-day holding period, but all polyethylene lots had off-flavors after 9 weeks. The off-flavor in the non-sealed polyethylene was a little surprising, but folding over the top of the bags as was done in these tests allow carbon dioxide to build up to 8.4 percent.

KING OF THE PESTS

(Continued from Page 9)

ble. Or he may think he doesn't have troubles — not serious ones."

He cited Walter Johnson and his ninety-three acres of cotton near Bakersfield, California. Johnson was happy, even thrilled, with his cotton.

He was making 1.87 bales to the acre — about five and a half times the average in Texas, where he learned to grow cotton. However, in 1951 he let University of California scientists run a test. When they used thirty-three dollars' worth of fumigant to the acre, they got 3.5 bales of cotton. That was \$220 worth more of cotton to the

acre than Johnson got from his untreated land.

The young nematologist scoffed at the estimate made some years ago by Dr. Benjamin Goodwin Chitwood, authority on nematodes, that the worms take a toll of 10 per cent of all the farmer and gardener grow.

"That was all that could be guessed at at that time," he said. "But we've discovered that you don't find nematodes until you look for them. We used to think they were just a Southern problem. But we find root-knot nematodes in potatoes in Idaho and Wisconsin, and root-knot almost anywhere potatoes are grown. Canadian wheat has lots of nematodes. Millions of acres of cotton have root-knot nematodes, and at least 1,000,000 acres of California lands have them.

"Fumigating sometimes astounds farmers. You fumigate for nematodes in tobacco and you get rid of black shank. You fumigate for the nematode in cotton and you get rid of fusarium wilt — and even boll-weevil losses are cut by as much as half. You get rid of nematodes, and the plant becomes resistant to a lot of other pests.

Dr. Gotthold Steiner, principal nematologist for the USDA, says, in substance, that soil fumigation is the answer to the nematologist's prayers. But he insists it does not solve the basic problem. He says the big need is for research. California, a big state with big nematode problems, leads in that field. The University of California has the only university department of nematology. It has seven nematologists; the state as a whole has nine of the nation's twenty-four.

There are many unsolved mysteries about nematodes. Why, for instance, can alfalfa be used as a rotation crop to control some nematodes which dearly love alfalfa? Why can some plants sustain mass attacks of nematodes without apparent serious damage? What makes *Crotalaria spectabilis* a trap crop?

Someday the answers to those and hundreds of other questions about nematodes will be found. They will be found by men so intrigued by the questions that they will devote their lives to studying the brainless worm which so long has outsmarted us humans. In any event, one thing has been learned. The better the farmer control his nematodes, the fatter his bank account grows. The End.

Over half of the people in Florida live in regions which are seriously understaffed by professional nurses, states John M. MacLachlan, in the University of Florida Press book, "Florida's Hospitals and Nurses."

USDA ISSUES STANDARDS CONC. TANGERINE JUICE

The U. S. Department of Agriculture recently issued U. S. Standards for grades of Concentrated Tangerine Juice for Manufacturing, the first to be formulated for this product. The standards were developed at the request of processors and handlers. The product is used primarily for re-manufacture into other food products.

The standards apply to concentrated tangerine juice preserved by any approved commercial method. They provide for commercial grades A and C for manufacturing. Before applying the standards, the product is reconstituted to a Brix of between 10.6 and 11.6 degrees. The Brix-acid ratio requirement for Grade A is not less than 9 to 1 nor more than 18 to 1, and for Grade C not less than 9 to 1 nor more than 21 to 1. The color and flavor of the product are given special emphasis in assigning the grade.

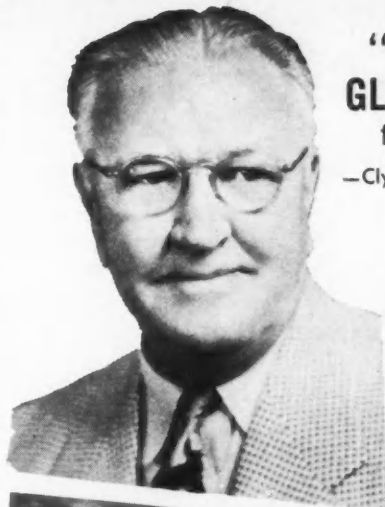
The standards become effective October 31, 1955. They are essentially the same as those proposed by the Department on June 28, 1955.

CITRUS INSECT CONTROL FOR NOVEMBER 1955

(Continued from Page 3)
icides may be used for the control of purple mite. DN Dry Mix is used at 2/3 pound per 100 gallons. Sprays are more effective than dusts but if a dust is preferred use 1 1/2% DN-sulfur dust. Aramite 15%, is used at 2 pounds per 100 gallons and over at 1 pound. Any of the above materials can be combined with wettable sulfur for rust mite control and with parathion for scale control. For satisfactory control, make a thorough application when using any of the miticides because mites are on both surfaces of the leaves.

Rust Mite Control: One gallon of lime-sulfur plus 5 to 8 pounds of wettable sulfur per 100 gallons is the best combination during cool weather for rust mite control. However, lime-sulfur should not be used on Hamlins, Jaffas, and tangerines. Sulfur dust may also be used but it is not as effective in cool weather as in hot weather. If sulfur dust is used, a very thorough application should be made on two sides of each tree.

For more detailed information refer to the 1955 "Better Fruit Program" or consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

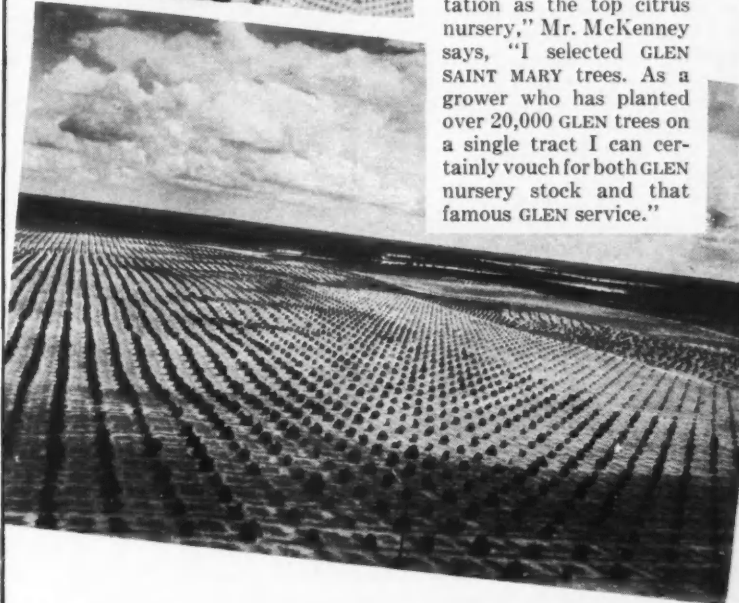


"You can depend on GLEN SAINT MARY for the finest in citrus trees."

— Clyde M. McKenney, Veteran Orlando
Citrus Grower and Cattleman.

When Mr. McKenney decided to plant the tract on which you see this beautiful grove, he was thinking about the future. He wanted the finest trees available to assure him a good return on his investment.

"Because of their reputation as the top citrus nursery," Mr. McKenney says, "I selected GLEN SAINT MARY trees. As a grower who has planted over 20,000 GLEN trees on a single tract I can certainly vouch for both GLEN nursery stock and that famous GLEN service."



Like other citrus growers throughout the United States and a dozen foreign countries, Mr. McKenney has found you can always depend on the 73 years experience of GLEN SAINT MARY NURSERIES to produce only quality trees.

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SAINT MARY NURSERIES COMPANY

Largest Citrus Nurseries in the World

Executive Offices: WINTER HAVEN, FLORIDA Estab: 1882

Methods Of Selling Fresh Citrus Fruits

(Concluded From Last Issue)

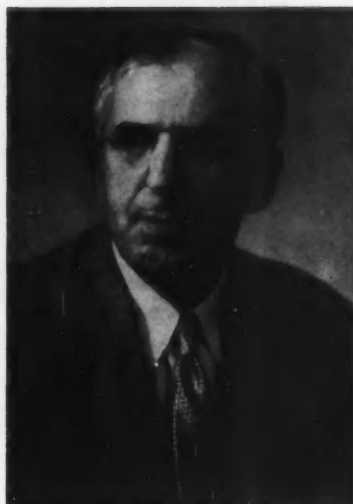
Conditions and Situations that Determine the Kind of Sale and Arrangements as to Terms of Sale

The various kinds of sales and terms of sales in general do not cause conditions but are the results of conditions and situations. Too often we blame conditions, such as low prices of grapefruit, on methods of selling when the cause may not be in the method of selling at all.

At one time about 50 per cent of Florida fresh citrus was sold at auction. As conditions changed selling methods have changed. With sales being distributed more to small markets and the advent of trucks and chain store buying relatively less fruit has been sold at auction.

One requirement for auction selling is that there be a large market with many kinds and classes of buyers. Large and continuous suppliers of fruit are desirable where auction selling is used. Auction selling has the advantage of supplying the various buyers with exactly the kind of fruit that meets their needs without having to buy some fruit that does not fit his exact needs. For example, jobbers who cater to fruit stands that may want large sizes, can secure these sizes without buying small sizes. Another advantage of auction selling is that it perhaps comes nearer to reflecting the exact value for different qualities than any other method of selling. Where supplies are quite light as at the beginning of the season, auction prices may reflect higher prices than other methods of selling.

The conventional consigned sale is used to advantage where there is no auction market and where buyers need to see the fruit in order to understand its quality. It is also a good method of selling to that segment of the trade that need very special kinds of fruit for their customers. Some varieties and packs of fruit are not always known to buyers and when this is true it is necessary for them to see the fruit before they are in a position to negotiate on price. Before grades, standards and terms were established consigned selling was the most important of all methods of selling. When markets are sluggish consigned selling is often resorted to because shippers resist cut-



H. G. HAMILTON

ting their F. O. B. prices. Because of this, consigned selling often shows up poorly with other methods of selling when compared on a seasonal basis. Certainly, when consigned selling is used only when prices are low it will appear on a seasonal basis that this is an unsatisfactory method of selling. However, if consigned sales are compared with other types of sales for the same days they will


show up much better.

Order buying is well adapted to chain stores since these buyers have uniform merchandising and pricing arrangements for a large number of store units, which call for uniform fruit. This type of sale or buying enables buyers to secure the exact kind of fruit that is needed without buying fruit that does not exactly fit their needs. In this respect it is similar to auction selling.

Not only are large buyers using this method of obtaining supplies but small buyers are also able to do so by using buying brokers and because of truck transportation. A recent study revealed that many small buyers will purchase only a small number of boxes of specific size or grade and have the fruit shipped in a pool car or truck with fruit of other smaller buyers.

Twenty-five years ago the conventional private sale was of the selling broker or direct method type. A car was loaded to normal run of grades and sizes and the shipper undertook to find a buyer for it. Today the buyer specifies what he wants in the way of grades, sizes, packs, etc., and the shipper undertakes to supply him with the kind of fruit he wants.

Over a long period of time consigned, auction, and private sale through brokers have decreased and buying brokers or buyers' representa-



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Complete engineering and machine facilities of the JOA COMPANY are now made available to businesses and industries throughout Florida. An experienced staff of engineers with the finest equipment stand ready to solve your most difficult problems and repair work. Call, write or visit our modern plant.

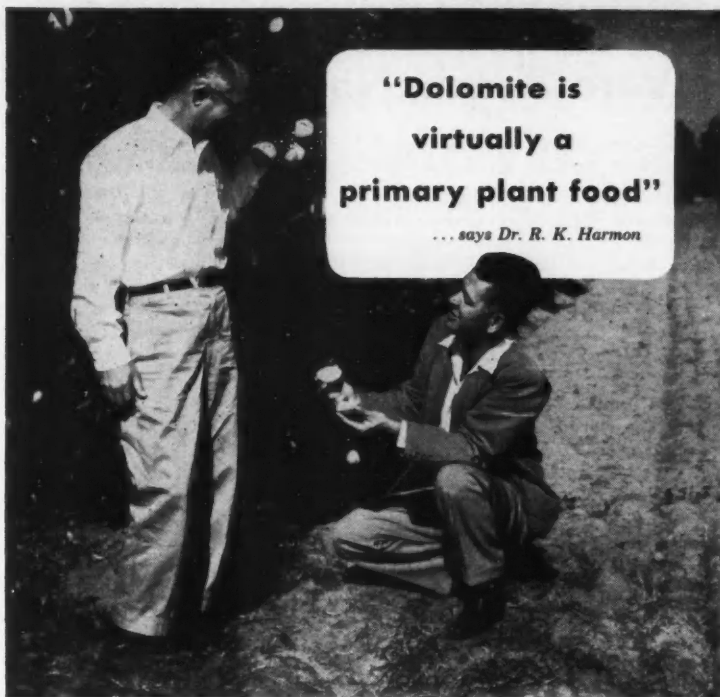
XUM

tives have greatly increased.

For as long as I have been associated with the citrus industry people have argued over the merits of F. O. B. selling vs. price arrival basis. The advocates of the F. O. B. selling feel that this is the most satisfactory way of selling because it prevents gluts. There are advantages of F. O. B. selling, but in my opinion, it does not prevent gluts. Gluts exist when a higher price is asked for a commodity than can be obtained for the entire supply. Such a situation may appear in the retail market, jobber, wholesale or at shipping point. It is thought by some people if no fruit left the state without being sold gluts could not occur. To be sure this is true for the shipper who has sold all his fruit, but for the shipper who has packed fruit which is not sold it would not be true. For the terminal market, wholesaler or jobber who has purchased fruit at a higher price than he can dispose of it for has a glutted market. So far as the individual is concerned it makes a big difference as to who has title to the fruit when a glut occurs. However, from the standpoint of the grovers it makes no difference whether the glut is at the shipping point or in the terminal market. When a glut occurs, it can only be relieved by lowering the price, reducing the supply or increasing the demand. The type of sale actually may have very little to do with it.

It is important that the price asked will clear the market of supplies. Some citrus areas believe this can be accomplished best by selling fruit on a price arrival basis. Where it requires several days for fruit to move from the shipping point to terminal market, conditions may change to such an extent that a price set at the time of shipping would not just clear the market. Hence, certain shippers resort to a price arrival sale in which all terms are agreed to exact price. Price is agreed on after or just before the car arrives, and it is the intent that the level fixed will just clear the market. This would be particularly important with conditions like lemons or watermelons where demand is affected greatly by weather conditions.

In closing I would like to give you a definition of a master salesman. He is one that knows the exact quality of every orange in his firm's supply and who knows the exact needs of every potential customer of the firm and dovetails the supply with the demand in such a way that the highest possible price is obtained for every orange and the consumer gets the best possible buy in each orange.



Dr. R. K. Harmon, Winter Haven grower and cattleman, and Bill Cook, d/p DOLOMITE Field Representative, examining fruit in Doctor Harmon's grove.

Doctor Harmon is a druggist as well as a citrus grower and rancher. As a druggist he appreciates the importance of magnesium and calcium in plant and animal health. As a grower and cattleman he is aware that d/p DOLOMITE keeps his groves and pastures in better health, his yields bigger and his profits higher.

"Because d/p DOLOMITE restores acid-alkali balance in the soil it makes other plant foods more readily available. I have found my groves and pastures healthier. I have less dieback and pruning and other maintenance are at a minimum," explains Doctor Harmon.

"d/p DOLOMITE makes my trees vigorous and hardy and such trees, of course, yield better and more fruit. I regard d/p DOLOMITE as virtually a primary plant food. And I find d/p DOLOMITE'S soil laboratory and field service most helpful to me in getting bigger, better crops."

YOUR crops also need this great soil conditioner and supplier of essential magnesium and calcium. Join the growing circle who are profiting from d/p DOLOMITE'S superior qualities.

Dolomite Products has a complete line of liming materials—Dolomitic and Hi-Calcium Limestone bagged and bulk. Also dried Hi-Calcium Limestone bagged and bulk.

For information or arrangements to have a d/p DOLOMITE field representative call on you, write, wire or phone the address below—or see your local spreader.



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Ninth Indian River Citrus Seminar Vero Beach, November 16-17

Wednesday, November 16, 1955

9:30 A. M.

Fred P. Lawrence, Citriculturist, Agricultural Extension Service, University of Florida — Presiding.

Invocation — Rev. Richard O. Knight, Pastor, Wabasso Methodist Church.

Florida's Horticultural Future — Dr. Walter Reuther, Head, Department of Horticulture, University of Florida.

Handling Efficiency in Grove and Packing House — Dr. Eric Thor, Professor, Agricultural Economics, University of Florida.

RECESS

Activities of the Citrus Experiment Station in Production Research — Dr. W. A. Simanton, Entomologist, Citrus Experiment Station.

"Whose Better Moustraps?" — Walter J. Page, Advertising Manager, Florida Citrus Exchange.

NOON

Norman G. Platts, Presiding
Maturity Factors in Relation to East Coast Grapefruit — Dr. E. J. Deszyck, Associate Horticulturist, Citrus Experiment Station.

RECESS

Quality Changes in Grapefruit Within a Packed Box — Dr. Paul L. Harding, Principal Plant Physiologist, USDA, Orlando.

PANEL: Improving Grapefruit Quality

Moderator: R. S. Edsell, Production Manager, Vero Beach

Panel Members: E. S. Beeland, Packing House Manager, Clearwater Growers Association; R. V. Phillips, Secretary, Packing House Managers Association, Haines City Citrus Growers Association; J. R. Graves, Graves Brothers, Wabasso, Fla.; Dr. Paul L. Harding, Principal Physiologist, USDA, Orlando

Thursday, November 17, 1955

9:30 A. M.

Bernard Parrish, Presiding

Invocation — Rev. James Armstrong, Pastor, First Methodist Church, Vero Beach.

Address — Hon. George Smathers, U. S. Senator.

The Spreading Decline Program — Dr. Ralph Miller, Member of the State Board of Control, State Plant Board.

RECESS

Timing of Oil and Parathion Sprays for Purple Scale Control — Dr. H. J. Reitz, Horticulturist, Citrus Experiment Station, Lake Alfred.

NOON

Art Krast, Presiding

1:30 — Citrus Budwood Certification Program — a Florida Movie — Narrator, Gerald Norman, Special Inspector State Plant Board.

Problem of Water Control in Florida — J. Abney Cox, Chairman, Central and Southern Florida Flood Control District.

RECESS

Further Studies of Citrus Root Distribution in Relation to Drainage — Dr. H. W. Ford, Assistant Horticulturist, Lake Alfred Citrus Experiment Station.

Pointers in obtaining Mite Control — W. L. Thompson, Entomologist, Lake Alfred Citrus Experiment Station.

For more milk at breakfast use milk instead of water in cooked cereals. Directions for cooking cereals in milk are usually given on the package.

ONE MORE REASON

why JOHN BEAN
Speed Sprayers are

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More Air Volume,
Better Spray
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Speed Sprayer air passages are aerodynamically designed to use the full power of engine and fan. Compare the air volume they deliver per horsepower and you'll have one of the keys to their superior coverage and penetration of trees.

At the Winter Haven Citrus Exposition in 1954, the Grand Sweepstake and six of the seven District Blue Ribbon Awards for quality fruit went to groves using John Bean Speed Sprayers. These growers have learned that they can depend upon their Speed Sprayers to help them meet their spraying schedules fast and effectively at minimum cost. It's a major factor in their production of profitable, top quality fruit. Let us demonstrate, at your grove, how a Speed Sprayer can be a good investment for you. Call or write today.

HANDY CALCULATOR for figuring concentrate and dilute spray solution is yours for the asking. Write for your copy.

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Division of Food Machinery and Chemical Corporation

VOLUSIA COUNTIANS ARE NOW ATTENDING CITRUS SESSIONS

DeLand — A citrus school has begun in Volusia County and will be held each Tuesday from 8 to 10 p. m., through Nov. 29, says T. R. Townsend, Volusia County agent.

Courses include citrus culture, varieties, fertilization, pest control and allied subjects.

Florida Agricultural Extension Service staff members, USDA personnel, State Plant Board specialists, and workers from the Citrus Experiment Station of the University of Florida College of Agriculture will instruct.

The Volusia County Citrus Commission is sponsoring the school.

GOVERNOR COLLINS SCHOLARSHIP PLAN WOULD PROVIDE MORE DENTISTS

Governor LeRoy Collins' plans for a scholarship program designed to provide more dentists for Florida's smaller communities moved a step nearer completion recently with the announcement that the Florida State Board of Health and the State Board of Dental Examiners together had worked out details for getting the program under way.

The dental scholarship bill, sponsored by Governor Collins and approved by the State Legislature, provides for the granting of scholarships to 10 Florida students each year for training in dentistry, according to a joint statement issued in Jacksonville by Dr. R. F. Wells, Panama City dentist, and chairman of the state dental examiner's board, and Dr. Wilson T. Sowder, of Jacksonville, state health officer.

CITRUS GROWERS REPORT

New Planting Method Is Big Success...

KEEPS ROOTS MOIST!

**Terra-Lite, the miracle planting medium
mixes with sandy soil; holds several
times its weight in water; stops leaching;
Low Cost; Cuts Water Bills.**



1 No need to wait for rain.
Benefits both seedlings and resets.



2 Mix Terra-Lite with soil
in planting hole. (As little as 10¢ a tree)



3 Terra-Lite holds and releases water
and fertilizer as roots need them.



**4 Water when planting; then once a
month. (Photos; Jack Ross Grove)**

Keep Posted

ON MATTERS

PERTAINING TO CITRUS PRODUCTION

BY READING

The Citrus Industry

EVERY MONTH

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THIS GROWER DIDN'T LOSE A TREE WHEN HE PLANTED IN

Terra-Lite® SOIL CONDITIONER

No need to wait for rain any more. Throughout these southern sandy soil regions, growers like Jack Ross (No. 4, above) report amazing results when trees are planted in a mixture of soil and Terra-Lite vermiculite. This low-cost mineral has an amazing capacity for holding water and fertilizer. Prevents wilt and dieback. And citrus thrives. Trees

planted a year ago are six months ahead of their growth schedule. Costs as little as 10¢ a tree and you save 1/3 to 1/2 on your water bill; save labor, too. To bring groves into early bearing, to cut costs, and to insure vigorous trees, plant anytime in Terra-Lite. Get Terra-Lite from your seed jobber or fertilizer supplier today or mail coupon for free data.

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Gentlemen: Please rush me free information about low cost Terra-Lite, the ideal soil conditioner, for citrus growers in sandy regions.

Name

Address

City Zone State

Citrus Mutual Foresees Prosperity For Florida Citrus Growers

More and more people are going to spend more and more money for more and more Florida citrus during the next five years, Florida Citrus Mutual forecasts.

This should, barring a national depression, assure continued prosperity for the grower and the industry as a whole, Mutual believes.

The super-cooperative, already on record in forecasting a good 1955-56 season, looks ahead five years to 1960 in a folder just issued and sees a "bright future".

The opinion is based on a realistic analysis of the relationship expected to exist in 1960 between Florida's greater production of citrus and the country's larger population and greater amount of income.

The folder reproduces charts used in a report made by General Manager Robert W. Rutledge at Mutual's annual meeting late last June. Decision to print the information in folder form was reached, it was said, "because of many requests and widespread interest" in Rutledge's talk depicting the future of the Florida citrus industry.

Mutual emphasizes that the prosperity it talks about is "tied very closely to the future of our country. If and when, for instance, consumer income should drop, and Florida production continue to increase, it would completely change the citrus grower's outlook."

It also points out that, as in every industry, "there are marginal producers" who cannot withstand "even relatively short unsatisfactory price periods." And there could be such periods, Mutual admits frankly.

Growers are reminded, however, that they "must continue to produce quality fruit and make wise marketing decisions." They will "not be in a position to take advantage of the future as indicated here if they are not organized and represented," the folder states. "The only way the Florida citrus grower can receive his share of the consumer's citrus dollar is by having complete and factual information."

One chart shows that in 1935 Florida produced 232 boxes of citrus per thousand persons, or less than a quarter box per person. During the 1954-55 season, production had risen to 777 boxes per thousand persons or



ROBERT W. RUTLEDGE

slightly more than three-quarters of a box per person. A standard Florida box contains one and three-fifths bushels.

During this same 20-year period, consumer disposable income increased from \$457 in 1935 to \$1,596 per person this year.

By 1960, Mutual estimates there will be 909 boxes of Florida citrus available for each thousand persons, or slightly more than nine-tenths of a box per person. Disposal income by 1960 will rise to \$1,705 per person, Mutual estimates.

"Consumption of Florida citrus today is almost four times as great as it was 20 years ago," the folder states. "As well, per capita income has had the same rate of increase. Present economic conditions indicate that per capita income will continue to increase."

"The increased Florida citrus production, in prospect for 1960, on a per capita basis, continues to hold a favorable relationship compared with the expected increase in consumer income."

The government estimates there will be 176,000,000 persons in the

nation by 1960, 10,000,000 more than today.

Food habits of the nation's families have changed radically in the past 20 years one chart shows, with Americans eating more citrus and less wheat.

Consumption of Florida citrus per person has risen from a half bushel in 1935 to one and a half bushels during the past season. In contrast, consumption of wheat in 1935 was approximately three and a half bushels per person, while in 1960 it will probably drop to three bushels. This decrease in wheat consumption is occurring, Mutual emphasizes, despite the steady increase in income.

In releasing the folder, Rutledge said a careful analysis would show that "the more money the American public has to spend, the more citrus it will buy because it is realizing more and more the healthfulness of citrus products."

"In the past 20 years, Florida citrus has grown from a relatively small industry to one with a product having a value of nearly three-fourths of a billion dollars, or \$750,000,000, at the retail level. No other agricultural commodity in the United States can point to the same healthy sustained and sound growth."

"This is partially due to a completely different, actually a unique, program for informing the grower of the true value of his product. No grower on any other agricultural commodity is so completely advised of the facts he needs to know for wise decisions in disposing of his crop."

"This remarkable growth pattern of Florida citrus has occurred without the use of government subsidies."

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Estimating Present And Future Insect Numbers . . .

Appraising this season's insect numbers and forecasting next year's is becoming an increasingly exact science as pest survey methods are standardized, U. S. Department of Agriculture entomologist said recently. Many of the methods are given in a cooperative report by the Agricultural Research Service outlining the wide variety of methods used each year in many States to survey more than 50 economically important insect pests.

Field entomologists obtain actual insect counts or damage estimates in sample areas by visual inspection, insect trapping, sweeping plants with nets, and soil or water sampling. They sometimes use unusual methods such as jarring tree limbs with a rubber-covered mallet to make plum curculionid beetles fall on a stretched sheet.

Insect counts are compared with established standards to classify infestations from "very light" or "non-economic" to "very heavy" or "very severe." Counts of hibernating or overwintering insect populations are used to estimate expected numbers during a coming crop season.

Farmers, pest-control agencies and operators, and insecticide material and equipment manufacturers use survey results to plan spraying and dusting programs.

Surveys are essential to detect spread of insect into new areas, as demonstrated by recent survey findings of yellow clover aphids in previously uninfested areas of the West, and of the gypsy moth southwest of the 80-year-old New England infestation.

Sometimes damage is easier to appraise than insect numbers. Feeding of thrips turns cotton plants brownish or silvery. Leaves chewed by white-winged beetles are more easily spotted than the ground-colored, "poisoning" insects themselves, which often bring death when disturbed.

Damage done by some forest insects can be seen from the air. Observers wearing amber face shields, which intensify yellows of insect-ridden foliage, use airplanes as flying observation platforms. They record on charts the degree and extent of forest foliage beneath them that is faded, discolored, or destroyed by larch sawflies and spruce budworms.

An insect's habits usually dictate survey methods. If a pest spends

part of its life in the soil, surveyors may use trowels, shovels, and even posthole diggers to extract soil samples, and sift or wash them to expose the culprits. Finding some insects or insect eggs requires painstaking leaf-by-leaf, twig-by-twig or animal-by-animal examination with hand lenses, or carrying of plant samples to laboratories for microscopic examination. Insects well-entrenched within plant parts, such as the pink bollworm, European corn borer, and Mexican fruit fly, may require plant or

fruit dissection.

The ordinary insect net, commonly associated with entomologists, is only one of many survey tools. Net sweepings of host plants are made for the spittlebug, potato psyllid, pea weevil, alfalfa caterpillar, lygus bugs, and numerous other insects. The man wielding the net may be a farmer making his own count of pests, to decide when to use insecticides, rather than a surveying entomologist.

Lures used to draw insects into traps vary widely. Bright yellow attracts green peach aphids and Japanese beetles. When teamed with a chemical attractant, a yellow-painted trap will draw Japanese beetles from 500 yards away. Traps for

It's time to Fertilize

Your Groves

If you haven't put on the heavy fall application of fertilizer already, by all means put it on this month.

Experience has proven that the citrus grower should apply at least 50% of his total nitrogen requirements for the year in this heavy fall application. The result is a heavy and uniform early bloom — it helps to get next year's crop off to a good start, upping production without increasing production costs.

If you have any grove problems, consult the Superior folks at either the Tampa or Fort Pierce offices. Experienced horticulturists and entomologists are here to serve you. Make use of them.

Don't forget, there are two good ways to economize in your fertilization program—(1) cutting out costly minor elements under favorable conditions, and (2) purchasing fertilizer in bulk.

*It pays
to buy
from folks
with
"Know How"*



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FERTILIZER AND CHEMICAL COMPANY

TAMPA—P.O. Box 1021, Phone 4-4131
FORT PIERCE—P.O. Box 246, Phone 87

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the high-flying cherry fruit fly must be set eight feet above the ground. Variations of old-fashioned sweet, sticky fly paper still prove most effective in trapping some insects. A sex attractant obtained from female gypsy moths brings male moths from half a mile away. Supplies of the attractant are sought in Portugal and Spain when low moth populations make it difficult to obtain in quantity in this country.

An old-fashioned, hand-operated clothes wringer is used to crush cherries and dump them onto a screen, through which cherry fruit fly larvae fall into swirling water and are easily found. For its purpose, this simple machine is as efficient as the complex gin-trash separating machine designed to isolate ping bollworms from cotton trash.

Special instruments take stored grain samples from bins for pest-testing. They include (1) a five-foot, hollow-tube grain probe with cells that are opened, filled, and shut while in the grain; (2) a cylindrical container with two halves that spring shut at a touch to capture about a gallon of grain; and (3) a "pelican" sampler, or handle leather pouch, for scopinog samples from the grain stream while the bin is being emptied.

Energetic European red mites that refuse to remain still to be counted on fruit-tree leaves are dumped into cardboard containers, along with the leaves, for a quick kill with chemical fumes. The leaves are then inserted between rotating brushes in an electrically-driven machine that dislodges mites and eggs onto cardboard discs for easy counting.

In surveys for harmful insects confined to a restricted locality, every precaution is taken to prevent spread. Surveyors for golden nematode of potatoes brush their shoes after leaving fields or potato-storage houses, usually wear cuffless trousers, and steam-clean vehicles used near infested properties before taking them to non-infested land.

TEXAS GRAPEFRUIT STANDARDS PROPOSED

A revision of the existing U. S. Standards for Grapefruit (Texas and States other than Florida, California and Arizona) was proposed by the U. S. Department of Agriculture. These standards when promulgated, will supersede those effective since August 20, 1954.

During the 1954-1955 season more than 2,500,000 boxes of grapefruit were produced in Texas.

The reason for revising the stan-



Senator Spessard Holland [left] presents the Distinguished Service Award of the Florida Fruit and Vegetable Association to retiring president Andrew Duda, Jr., Oviedo. The award, highest honor of the Association, is presented annually for outstanding service to Florida Agriculture and is rarely given to a member of the Association. Duda, a vegetable grower, cattle rancher and citrusman, is vice president of the Florida Agricultural Council; a member of the Governor's Committee on Agriculture; the Governor's Committee for the Refugee Relief Program; and served as president of the Association for two terms. Senator Holland was a recipient of the award in 1951 for his work in Congress for Florida agriculture.

WAVERLY COOPERATIVE HOLDS FORTY-FIRST ANNUAL MEETING . . .

Waverly Growers Cooperative, one of the outstanding citrus cooperatives of the state, has just held its forty-first annual meeting. At this meeting lots were drawn for 106 lots in a new planting just north of Haines City and deeds will be mailed to the new owners as soon as they can be prepared. President W. C. Pedersen, Superintendent James Morton, Production Manager C. D. Kime and other officials of the organization are to be congratulated upon the success which has attended this great cooperative during the many years of its service to the citrus growers numbered among its membership.

dards at this time is to provide diameter ranges for the various pack sizes of grapefruit packed in 1-2/5 bushel boxes. The present standards provide only diameter ranges for the pack sizes for fruit packed in 1-3/5 bushel boxes. These ranges are not applicable to the smaller box. The use of the 1-2/5 bushel box in Texas was started during the last shipping season.



LYCHEE

NURSERY STOCK

AIR LAYERS FROM OUR OWN BREWSTER TREES

18"-24" Sizes and Larger
Single Plants from \$3.50

Substantial 'Sliding Scale' Discount on quantity purchases for Grove plantings

You are cordially invited to visit our groves.

Your West Coast Head for all Subtropical Fruit Trees.

PALMER NURSERIES

OSPREY, FLORIDA

J. H. Popham, Jr., Mgr.

MEMBER
FLORIDA LYCHEE GROWERS ASSOCIATION
FLORIDA NURSERY AND GROWERS ASSN.
NATIONAL ASSOCIATION OF NURSERIES

Florida Citrus Commission Advertising Now Underway

The full force of the Florida Citrus Commission's merchandising-advertising campaign for the 1955-56 season gathered momentum as initial fresh fruit shipments from Florida infiltrated the nation's major market areas.

To kick-off the new fresh fruit season, the Commission during November will utilize 800-line black and white newspaper ads for both fresh oranges and grapefruit in 150 leading daily newspapers covering 100 market areas throughout the United States. In addition, full color ads for both oranges and grapefruit will appear in New York, Chicago, and Philadelphia.

The nation's citrus consumers will also be informed of the arrival of Florida's new citrus crop over television and radio throughout the country. Over the extensive 560-station network of Mutual Broadcasting System listeners will hear Florida citrus spots eight times weekly, both on network day and night broadcasts.

To complete the November advertising schedule, the Commission will utilize an average of five television commercials weekly over 100 television stations situated in major market areas; all this to tell Mrs. America that Florida citrus is back on the market.

Meanwhile, the Commission's 65-man field merchandising force has already gone into action in the highly effective field of merchandising Florida citrus at the point of sale. All over the country, Commission representatives are at work building retail outlet displays to attract the interest of the buying public.

Using eye-catching materials coupled with in-store promotions and special campaigns to attract citrus customers, the Commission merchandising crew is now placing emphasis on the movement of fresh grapefruit with plans to include a bigger than ever push on fresh oranges when they arrive on the market in volume.

Want Surplus Tax Revenue Applied To State Road Fund

Backed by the support of more than 300 organizations, the Florida Highway Users Conference meeting recently in Orlando agreed to continue its campaign for restoration of the surplus auto tag revenue to the State road fund.

In reporting to the Conference, S. O. Chase, Jr., chairman of the project adequate roads committee (PAR), pointed out that the surplus unpledged tag money that is sought for highway improvement is that part that now goes to the general fund and not the share that is earmarked by the Constitution for schools. He explained that prior to 1931 these fees were allocated for road purposes.

The Conference also recommended that the appropriate state officials make a comparison between Florida traffic laws and the model "Uniform Traffic Code", which is recommended for adoption by all states. This was proposed in order to learn how much legislation is needed to bring Florida close into conformity with the national code.

Conference officers elected were: Chairman — S. O. Chase, Jr., Sanford, President, Growers and Shippers Lea-

gue of Florida; Vice Chairman — Harold Cole, Executive Vice President, Florida State Chamber of Commerce, Jacksonville; and Secretary — J. Pendleton Gaines, Executive Vice President, Florida Motor Court Association, Orlando.

In addition to Conference officers, members of the Executive Committee elected were: Richard Fincher, Miami Auto Dealers Association, Miami; Marvin Holloway, Tampa Motor Club, Tampa; Arch Livingston, Florida Mobile Homes Association, Tallahassee; and Gordon Stedman, Growers and Shippers League of Florida, Orlando. The retiring chairman and secretary are W. J. Barritt, Jr., of Tampa, and Charles A. Gertner of Jacksonville.

The Florida Highway Users Conference is a 20-year old council of approximately 45 Florida associations interested in the advancement of highway transportation.

Pasco County, with a local quota of \$500 to be raised for construction of a new 4-H Camp at Lake Placid, raised \$528.25 for the project, says C. A. Byrd, assistant county agent.

THIS MAN "SELLS" CITRUS PROFITS



He's your International Fertilizer Field Representative. He knows you will get profitable results when he recommends International Fertilizers. He makes sure you get the exact grades you need—and he often urges you to make heavier applications, because that's one of the most important factors in the profitable production of citrus.

You get big returns for every dollar you invest in International Fertilizers because they give you a correct balance of plant foods plus special ingredients such as soluble sulfate of magnesium and sulfate of potash and the trace elements needed for maximum production of quality citrus in Florida. International Fertilizers help keep your trees in good condition . . . better able to withstand cold, disease and dry weather and capable of producing fruit with good color, fine flavor and more solids.

So, for Satisfaction at Harvest Time, call your International Fertilizer Field Representative and Dealer . . . they "sell" citrus profits.

plant food division
**INTERNATIONAL MINERALS
& CHEMICAL CORPORATION**

General Offices: 20 North Wacker Drive, Chicago 6
Florida District Sales Office: Mulberry, Fertilizer
Manufacturing Plants: Mulberry and Jacksonville

British Market Reopened To Canned Florida Citrus

Sen. Spessard L. Holland announced recently that an agreement has been reached with the United Kingdom for the sale of \$500,000 worth of canned grapefruit sections.

The canned product — Florida produces almost all canned grapefruit sections — will be sold under provisions of the Mutual Security Act.

Holland said, "We understand contracting is to begin immediately and we expect the entire amount to be shipped prior to the end of November."

Big Victory

This represents a big victory for the Florida citrus industry which has been trying ever since World War II to regain the British market where before and during the war it did a big business.

Florida trade groups and the Florida congressional delegation have been seeking a way to crack open the door to the British market.

Big drawback to sale of Florida citrus in Great Britain has been the opposition of Jamaica, which now principally supplies the British market with processed citrus. Jamaicans have protested that any unregulated competition from Florida citrus men would be ruinous to them.

No word was said on the point, but it is believed one reason why the early movement of the sections is expected is because this will enable the Florida product to be gone from the British market when the Jamaican product is ready for selling.

Holland said, "This should benefit our own citrus industry greatly by removing from the shelves of grapefruit canners approximately 25 per cent of grapefruit sections immediately."

Under current prices the \$500,000 will represent about 175,000 cases.

Holland added, "I'm glad that our efforts of many months have overcome the artificial barrier which prevented our participation in the British canned grapefruit section market and I hope full and free participation in this historic market will be possible."

"Opportune Time"

At Lakeland, Fla., Robert Rutledge, general manager of Florida Citrus Mutual, said, "This is a partial reward to the grower for almost two years of work in trying to bring about reopening of the British market. This purchase comes at a most opportune time because it is the beginning of a new season."

He said Martin Hearn of Mutual's

export division, the Florida Cannery Association and "others have done a splendid job in this effort."

Last season, Florida canners, in anticipation of reopening of the market, went in heavily for producing canned grapefruit sections, thus creating a bigger carryover than normally.

NATIONAL FORESTS

YIELD \$70 MILLION

IN TIMBER HARVEST

Timber valued at more than \$70 million was harvested from national forests during the year ending June 30, 1955, according to figures released by the U. S. Department of Agriculture.

The Southern States south of Virginia — including Florida — produced over 645 million board feet, valued at well over \$10 million.

Reports from Forest Service field offices show an increased harvest through the country, bringing the total cut to 6,328,229,000 board feet. This compares to 5,365,113,000 board feet cut during the fiscal year 1954.

GOVERNOR OF JAMAICA SPOKE AT FFVA MEET

The Governor of Jamaica, (B.W.I.) Sir Hugh Foot, was the principal speaker at the annual banquet of the 12th Annual Convention of the Florida Fruit & Vegetable Association at Hotel Hontainbleau, Miami Beach, on October 5, 1955.



Sir Hugh Foot

Sir Hugh, a noted speaker, presented a message of wide interest to every guest and member.

Sir Hugh, whose official title is Captain General and Governor-in-Chief of Jamaica and its Dependencies is 47 years of age.

He has twenty-five years service in different parts of the British Commonwealth and has acted as Governor of Cyprus and Governor of Nigeria. He was in Jamaica as Colonial Secretary from 1945 to 1947 and acted as Governor of Jamaica in 1945.

EMJEO

(80/82% MAGNESIUM SULPHATE)

Many years a favorite source of soluble magnesia for Florida soils. Used extensively in fertilizer mixtures for citrus crops and vegetables. Especially useful and economical for direct application where only magnesia is required.

Florida growers now consider magnesium a primary plant food in the same category with nitrogen, phosphorus and potash.

The recommendations of the Florida Citrus Experiment Station at Lake Alfred, published in January 1954, stress the need for large application of magnesium for Citrus in soluble form and state that it is usually applied as a Sulphate.

Ask your fertilizer manufacturer for EMJEO, long a dependable source of this key plant food.

BERKSHIRE CHEMICALS, INC.

420 Lexington Avenue

New York 17, N. Y.

Magnesium

For a Full Harvest

U. S. Estimates Florida Citrus Crop Of 55-56 Season At 133,000,000

The Federal Government's first estimate of the Florida Citrus production for the present season is 133,600,000 boxes. The estimate was issued on October 10 as the preliminary estimate for the season. This total is divided as follows:

Early and midseason oranges, 49,200,000 boxes.

Valencias, 39,000,000.

Temples, 2,800,000 boxes.

For a total of all oranges of 91,000,000 boxes.

Tangerines are estimated at 4,600,000 boxes.

Grapefruit, seeded and seedless, 38,000,000 boxes.

For an overall total of all citrus of 133,600,000 boxes.

This compares with an actual pickout of 128,000,000 boxes last year.

While everyone complains about these Federal estimates, it still remains that they are used as a guide to the size of our crop. Last year the Federal estimate was too high and the year before that it was too high. How it will come out this year remains to be seen.

Exceeds Pickout

The orange figure is 5,000,000 boxes less than the original 1954-55 figure, and 2,400,000 boxes higher than last season's final pickout.

With depleted stocks on hand of virtually every type canned orange juice, the forecast for that variety elicited no worries or furrowed brows from citrusmen, even though many had been anticipating a slightly lower initial figure.

The tangerine forecast is down 600,-

000 boxes from last season's 5,200,000-box final total, bringing to the members of the big Florida Tangerine Cooperative hopes of an even brighter season this year than last.

U. S. Estimates

National the estimate is almost exactly its 1955 final total, with an overall figure today of 178,055,000 boxes compared with 179,150,000 boxes last season.

California's early and midseason orange estimate figure is down 2,200,000 boxes under the final pickout last season, at 13,500,000 boxes.

Never refuel a tractor while the motor is running or while it is extremely hot.

ED PRICE, JR., JOINS FRUIT INDUSTRIES

Ed H. Price, Jr., manager of the big Florida Gladiolus Growers Association since 1940, has resigned to become vice president in charge of industrial relations for Fruit Industries, Inc., which operates citrus processing plants in Bradenton and Cocoa.

Directors of the flower association has formally accepted Price's resignation and started a search for his successor. Price will remain with the association until a replacement is found.

Price said he was leaving his \$15,000 a year job with the "friendliest of relations" with the association. He had been reelected manager at the association's recent annual convention in Miami Beach.

Growing ornamentals is becoming more and more important in Florida.

AGRICULTURAL PRODUCTS RESEARCH SUMMARIZED

Major research developments on the utilization of Southern farm products at the Southern Utilization Research Branch of USDA, Agricultural Research Service, are reported from time to time in papers published in various technical journals.

A complete list of these publications for the first half of 1955 is now available for distribution.

All areas of research in which the Southern Utilization Research Branch is interested are covered in the list, which is arranged according to subject, and gives the title, authors, publication references, and a short abstract of the subject matter of each article.

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The West Indian . . . Or Barbados Cherry

The West Indian cherry is a shrub or small tree that has been grown in South and Central Florida for many years, mainly as a backyard fruit plant. It is valued for its fruits which have a characteristic flavor and which are usually eaten out-of-hand. In recent years this plant has received considerable attention as a result of the extremely high vitamin C content of the fruit.

Common Names. In Florida it is known as the West Indian cherry or Barbados cherry. In Puerto Rico it is called Acerola and in Cuba and other Latin American countries it is known as Cereza. Cereza is a Spanish name for cherry, and Acerola is a Spanish name originally used for the fruit of the Hawthorn.

Scientific Names. *Malpighia glabra* (mal-pig-l-a gla-bra) is the name used most commonly in Florida, but in Puerto Rico it is called *Malpighia punicifolia*. The correct scientific name is in doubt at the present time and it is not certain whether there are two species or one species representing several different forms.

Botanical Relationship. The West Indian cherry belongs to the family Malpighiaceae. Other plants included in this family that are cultivated in Florida are the following: *Thryallis glauca* (synonym *Galphimia glauca*), a popular ornamental shrub with yellow flowers; *Malpighia coccigera*, a low growing ornamental shrub with prickly leaves and pinkish flowers; several species of *Stigmaphyllon* which are vines with attractive yellow flowers; *Hiptage benghalensis*, a climbing shrub with white or pink flowers; and *Byrsonima crassifolia*, a tree native to Central America with attractive yellow flowers and somewhat edible fruit. One species, *Byrsonima lucidum*, is a shrub that is native to south Florida and the Keys.

There are several forms of *Malpighia* which are grown in Florida. Probably all are *M. glabra*, but they can be divided into two groups: 1) those which have large edible fruit and large leaves; and 2) those with small, inedible fruit and small leaves. The latter are grown as ornamental shrubs throughout peninsular Florida and should not be confused with the true West Indian cherry. These ornamental forms have fruits up to 1/4 inch in diameter, usually bright red in color, and rather dry and insipid.

Many Florida citrus growers are planting small acreages to other subtropical fruits as a side line. Some of these growers may be interested in this report issued by the Sub-Tropical Experiment Station at Homestead. — Editor.



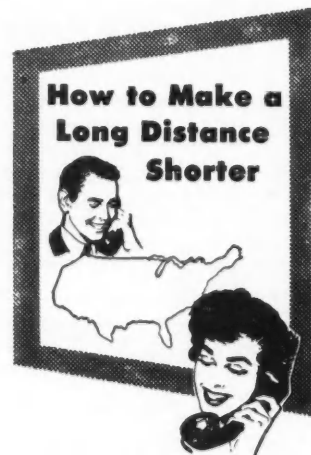
R. BRUCE LEDIN

The plant usually remains shrubby and has very attractive flowers. Several introductions of the small fruited forms have been made from various Latin American countries and often they are offered for sale as *Malpighia* species, but sometimes as *M. glabra* and even *M. punicifolia*.

The West Indian cherry should not be confused with the true cherry, *Prunus avium*, a member of the Rose family which is grown in temperate climates and not in Florida. Nor should the West Indian cherry be confused with the Surinam cherry, *Eugenia uniflora*, a member of the Myrtle family. The Surinam cherry is grown throughout most of Florida and is a popular shrub for yard planting, especially for hedges. Superficially the West Indian cherry does resemble the fruit of both of the plants mentioned above, but its structure and flavor are quite different. The true cherry is smooth and not lobed; the Surinam cherry is usually nine-ridged or fluted.

Native Countries. *Malpighia glabra* is native to southern Texas, all of the Central American countries, northern South America to Peru and Dutch Surinam, and all of the West Indian Islands from Trinidad to Cuba.

History. The natives of these countries have undoubtedly eaten the fruit of this shrub for many centuries. The early Spanish explorers observed the native use of this fruit and because they thought it resembled the true cherry which they grew in Spain, they named it "Cereza". The name "Barbados cherry" appears to have been originated by Hans Sloan in 1752 when this plant was described as growing in many gardens in Jamaica. It was probably introduced into Florida from Havana, Cuba, sometime in the 1880's by Pliny Reasoner, for it is listed in his Royal Palm Nursery catalogue for 1887-88, but it was not recognized as an edible fruit until 1933. It has been grown in South and Central



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al Florida as a backyard fruit plant ever since.

DESCRIPTION

The West Indian cherry is a shrub or sometimes a small tree if pruned to develop a central trunk. In 15 years the plant will become 15 feet high with numerous branches, some growing more or less erect and rather open, but in some seedlings they are thick and spreading. Sometimes plants will tend to sucker from the base, but this can be discouraged by pruning. The leaves vary in size and shape, even on the same plant. Those produced on short spur-like branches are small and crowded. New leaves on young shoots are much larger and possess appressed hairs which sometimes irritate the skin. As the leaves mature, these hairs disappear. The flowers are $\frac{1}{2}$ inch or more across, the color varying in different seedlings; some are pink, red, or rose, others are white. They appear in April along with the new vegetative growth and continue to appear off and on through the summer and fall, often as late as November. They attract bees in large numbers.

The fruit, botanically, is a type of berry-like drupe. It is globular but usually wider than long, shallowly lobed, of various shades of light orange-red to deep purple-red in color. The skin is very thin and delicate and easily bruised. There are three winged and pitted stones, each of which contain one seed, that make up about 15 to 25 percent of the fruit. The average size of the fruit is about 1 inch in diameter and the average weight is about $\frac{1}{3}$ ounce. The largest fruit, however, will become $1\frac{1}{4}$ inches in diameter and weigh over $\frac{1}{2}$ ounce. The fruit resembles the northern crab apple in taste, because of the presence of malic acid, but it has a flavor all its own. Some clones are quite tart and acid; others are less acid and some can be called sweet. The juice that can be extracted from the fruit is about 60 to 70 percent by weight (less than 60 percent in the green fruit), but the total liquids present in the fruit would average 80 percent or higher.

The fruit will mature in 3 to 4 weeks from flowering. Some clones flower and fruit from April to November almost continuously. But usually there are peaks of heavy flowering followed by heavy fruiting, in some clones only 3 to 4, in others, 8 to 10. The fruit size is dependent on adequate rainfall or irrigation and fertilizing practices.

YIELDS AND HARVESTING

The amount of fruit produced varies on the different seedlings as well as with cultural practices. Some clones

produce more heavily than others. The highest yield so far obtained at the Sub-Tropical Experiment Station was in 1954 from plants 5 years in the field. An average of 21 pounds of fruit per plant was harvested from a Sweet selection; this amounts to 5,880 pounds of fruit per acre, or nearly 3 tons of fruit. The fruiting season extends for 3 to 7 months, depending on the clone. The fruit must be picked every other day during the peak producing periods. The fruit can be picked just as it is beginning to turn pink or red. Completely ripe fruits will spoil quickly and should be utilized as soon as possible after harvesting. The ripe fruit is extremely perishable and cannot be shipped. The half-ripe fruit however, will usually hold up well for several days, especially under refrigeration.

ASCORBIC ACID OR VITAMIN C CONTENT

In 1946 Asenjo and Guzman in Puerto Rico reported that they found the fruits possessed extremely high amounts of ascorbic acid; the content varied from 1,030 to 3,309 milligrams per 100 grams of edible matter, or 1 to 3 grams of this vitamin in 100 grams (approximately $3\frac{1}{2}$ ounces) of juice. The green fruits were the highest, the fully ripe fruits the lowest in ascorbic acid content. Mustard in Florida in 1946 also reported on the high ascorbic acid con-

tent of the West Indian cherry; she found 1,028 to 4,676 mg. per 100 g. edible matter. Here again the green fruits were the highest. She also found 509 to 673 mg. per 100 g. ascorbic acid in jellies, a surprising amount since cooking tends to destroy vitamin C.

The vitamin C content of the fruit has been found to vary with the clone; some seedlings produce fruit with more ascorbic acid than others. But to date all the selections that have been tested and are known to be the true West Indian cherry have all shown relatively high amounts, varying from 1,000 to over 4,000 mg. per 100 g. The vitamin content also varies with the ripeness of the fruit—the green fruit has more ascorbic acid, the pink-green or half-ripe fruit and the red-ripe fruit are mostly the same. The time of the year also affects the concentration of the vitamin—more ascorbic acid is present in the fruit in July than in May.

The daily requirement for an average adult under average conditions is 75 mg. of ascorbic acid (minimum 20-25, adequate 40-45, optimum 75-80). A fruit with more than 60 mg. per 100 g. of ascorbic acid is considered an excellent source of this vitamin. Most fruits are more or less a fair source of ascorbic acid, but the West Indian

(Continued on page 30)

BATHE

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Millions have taken the baths at Hot Springs—America's only health resort with natural thermal waters under the regulation of the Director of the Nat'l. Park Service, U.S. Dept. of the Interior—and, countless people have testified to the magic qualities of these world-famous baths. You, too, can find relief for jangled nerves, aching muscles, stiff joints, hardening of the arteries, and, yes, even rheumatism and arthritis.

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The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

WEST HILLSBOROUGH AND PINELLAS COUNTIES

J. A. Hoffman

Several good rains the past week have brought groves out of a wilt in part of this section. Rains have been very spotted, while some groves have had plenty of rain, others not far away are suffering from lack of rainfall. Few groves are being irrigated due to the softening of the fruit.

Cover crops are being cut in and groves prepared for the fall application of fertilizer, which is already underway at this time.

Fruit has sized up and beginning to break color. Maturity tests are being run on early fruit. Early fruit has been moving since the first of October.

EAST HILLSBOROUGH AND PASCO COUNTIES

E. A. McCartney

Most of the packing houses have been put in shape for this season and are starting operations. Grapefruit and early oranges are moving in small quantities.

The fall fertilizer application is under way. Most groves are in good condition and have an average crop of fruit. Some varieties are light in this section but over all there is a good crop. Some groves were hard hit by the dry weather and did not set the late bloom after the rains came.

Melon growers are busy planting and getting land in shape.

Cattle men have been putting on fertilizer to get a growth ahead of the frost. Fall vegetables have had good growing weather. Growers are looking forward to fair prices, especially early and mid-season oranges.

SOUTH POLK, HIGHLANDS, HARDEE, DESOTO AND SARASOTA COUNTIES

C. R. Wingfield

Cool nights during early October has caused fruit to color and has helped maturity. The movements have increased in both grapefruit and oranges. Fruit buyers are

still rather active in buying early and midseason oranges.

Citrus groves are still in need of more moisture although we have had showers from time to time. In some locations the moisture is rather low and will need irrigation if no rain falls within a week. Cover crops are being worked down and growers will soon be ready for their fall application of fertilizer.

This application is a very important one and care should be taken to select the right amount as well as the proper plant foods. Some trees are heavy fruited while others are light and consideration should be taken.

Rust mite have been very active and control measures are being taken. In some areas Red Spider is showing up so a check for them should be made.

Vegetable crops are being moved in this section and by the time of this publication beans will be moving in the Lake section and possibly some from Highlands county.

NORTH CENTRAL FLORIDA

V. E. Bourland

Weather has been hot with scattered rains. Groves in general are looking good, fruit is improving in size and quality, and the cool weather we are having now should help color and maturity, which will be good for all parties concerned.

There has been quite an amount of fruit picked and being picked, and prices seem to be satisfactory up to date. Scale still bad in lots of groves, some red spider, and rust mite, but growers are continually checking them.

All young trees have been worked and fertilized which looks good. It is time to cut good fire lines, clean ditches and banks. Pastures as a whole are holding up in good shape.

HIGHLANDS AND POLK COUNTIES

J. K. Enzor, Jr., R. E. Lassiter, Jr.

By the middle of October some fertilizer activity has begun. Most growers are beginning to make plans for fertilizer application to start the latter part of October or early November. This fall application is considered to be very important in relation to fruit-set next spring.

In the last month or six weeks red scale has developed into serious proportions in many groves. Quite a number of growers are using parathion for control of this insect at this time. The relatively dry weather throughout the late summer and early fall undoubtedly accounts for some of this build-up.

Purple mites have not as yet become numerous but this mite should be kept in mind and groves should be checked for it from now on.

As often happens, growers feel that the USDA estimate published this month is high. According to what we see in this area we are inclined to agree with that opinion.

Most of this section has received some rain during the week of October 10th. This was very welcome since there were areas beginning to get dry again.

PRODUCE

MAXIMUM

CROPS

Of

HIGHEST

QUALITY

With

LYONS

FERTILIZERS

ADVERTISEMENT — LYONS FERTILIZER COMPANY

**Uncle Bill Says:**

A feller who is known as an authority on the subject of nematodes wrote a story in the Saturday Evening Post a week or so ago tellin' how this durned little almost invisible pest has been playin' hob with crops of all sorts al over the world fer centuries and how up to now they ain't bin no sure-cure method of stoppin' it . . . 'n our own fine scientists at the Citrus Experiment Station and in the Federal Department of Agriculture agree that they ain't as yet been found no truly effective remedy fer destroying this pest.

However, both these agencies and the few top-notch nemotologists in this country is workin' night and day to develop some means of destroyin' this bug . . . and if that remedy is ever found, as we feel certain it will be, we'll bet that the folks here in Florida with the help of outside scientists, will be the ones to bring it to light

It is jist simply a matter of history that the citrus folks of this state have from time to time had to come up with answers to production problems that jist seemed almost impossible, and each time they've found the answers . . . so while it may take time we're bettin' that with the growers, the scientists and the government all cooperatin' they will be a remedy discovered that will put the nematode out of business.

Without recitin' all of the problems that has come up to hamper Florida citrus growers in the past, everyone knows that they has been a lot of mighty tough problems licked throughout the years of Florida's citrus growin' history . . . and it seems reasonable to believe that this great Florida industry will keep right on lickin' any problem that they have to face.

They is still a lot of groves which hasn't received their fall application of fertilizer up to now, but since all growers realize that the fall application is most important they probably won't be many groves which won't have received this important food ration in the very immediate future.

And fer our money, they ain't no better feriiizer to be found anywhere than Lyons Fertilizers . . . they live up to their slogan that Lyons Fertilizers Produce Maximum Crops of Highest Quality.

UNCLE BILL

Brine Shrimp Used As Test For Insecticide Residues

A tiny, insecticide-sensitive crustacean—the brine shrimp—holds promise of providing an excellent test for the presence of insecticide residues, the U. S. Department of Agriculture reports.

Insect pathologists of the Department's Agricultural Research Center, Beltsville, Md., have found that brine shrimp react to extremely small amounts of several insecticides, even when the toxicants are greatly diluted in either fresh or salt water. Further, the shrimp make an ideal laboratory tool, being easy to maintain and use. (Brine shrimp for laboratory use are about 1/8 inch in length.)

A test employing these shrimp—termed a "bioassay" by the scientists—was developed at Beltsville mainly to find out whether cases of unexpected mortality among honey-bee colonies were due to accidental exposure to insecticides applied on nearby crops (an increasing problem in U. S. farm areas) or to disease or other natural causes. But because of its sensitivity and simplicity, the test may prove valuable also in determining the presence of insecticide residues on agricultural products. This is important in developing safe uses for insecticides.

In their tests, the scientists found that brine shrimp were sensitive to solutions containing as little as 1 part of insecticide per 100 million parts of solution. The shrimp reacted to all the insecticides tested—chlor-dane, DDT, lindane, methoxychlor, and toxaphene—in this extremely diluted form.

Brine shrimp need not be maintained alive in the laboratory which is often a difficult task. Instead, their eggs can be stored for years under normal laboratory conditions. Since the eggs are commonly sold as tropical fish food, they are readily available.

When residue tests are to be made, a few eggs are shaken into a container of salt water. The shrimp hatch within 24 hours, and 72 hours later they are large enough for test use. A few drops of yeast added to the rearing solution every few days provides enough food to keep the shrimp growing.

The Beltsville scientists have found that it is not necessary to wait for the shrimp to die in making the test. The presence of an insecticide residue in a test solution is indicated by

changes in the normal swimming habits of the shrimp. The rapidity with which these changes take place is a measure of the strength of the insecticide concentration. Even at the low test concentrations used, such changes were noticeable in less than 2 hours. The shrimp test thus provides a much more rapid and economical means of determining amounts of insecticide residues, especially in large-scale testing operations, than ordinary methods of chemical analysis.

THE WEST INDIAN . . . OR BARBADOS CHERRY (Continued from page 27)

cherry is superior to practically all other fruits in this respect.

The West Indian cherry is also considered a fair source of vitamin A, containing 1,010 I.U. per 100 g. edible fruit (the daily requirement is 5,000 I.U.). The fruit also contains thiamine, riboflavin, and niacin; these vitamins are present in low amounts and do not differ appreciably from any other fruits. The fruit is a good source of calcium and iron, but contains only small amounts of phosphorus.

CULTURE

Propagation. The West Indian cherry can be propagated by air layers and by cuttings. Air layering is done by the usual method of girdling the stem and removing a ring of bark and then covering this girdle with damp sphagnum moss and a sheet of plastic vinyl film. Rooting in the moss should take place in 4 to 6 weeks. The best method for making cuttings has not been determined. It is suggested that leafy hardwood cuttings be used, varying from 4 to 10 inches in length and 1/8 to 3/8 inch in diameter, with two or three leaves on the upper portion of the stem. The rooting medium should be light and porous (vermiculite, peat moss or sand, or mixtures of two of these materials is suggested) and the cuttings should be kept in a very moist or humid atmosphere. A rotting hormone can be used to hasten the rooting process. Roots should form within two months.

Seed germinate rapidly, but some plants produce fruits in which many of the seeds contain non-viable embryos; the percentage of germination of these seeds will frequently be less than 50 percent. In preparing for planting, it is not necessary to remove

seed from the stone; the seed is quite delicate and easily damaged if one does try to remove it. The stones are cleaned of all flesh and dried before planting. Dusting the stones with a seed protectant will aid in preventing damping-off of the seedlings.

(Concluded Next Issue)

Classified Ads

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STATE OF FLORIDA,

COUNTY OF POLK.
Before me, a notary public in and for the State and County aforesaid, personally appeared S. L. Frisbie, who having been duly sworn according to law, deposes and says that he is the Editor of The Citrus Industry and that the following is to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March, 1922, embodied in Section 637, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher — Associated Publications Corp., Bartow, Fla.

Editor — S. L. Frisbie, Bartow, Fla.

2. That the owners are:

Associated Publications Corporation, Bartow, Florida.

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S. Lloyd Frisbie, Bartow, Fla.

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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holders appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold that of a bona fide owner.

S. LLOYD FRISBIE
Manager

Sworn to and subscribed before me this 11th day of September, 1955.

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